The Journal of the American Association of Nurse Anesthetists

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Volume XXVIII June 1960 Number Three

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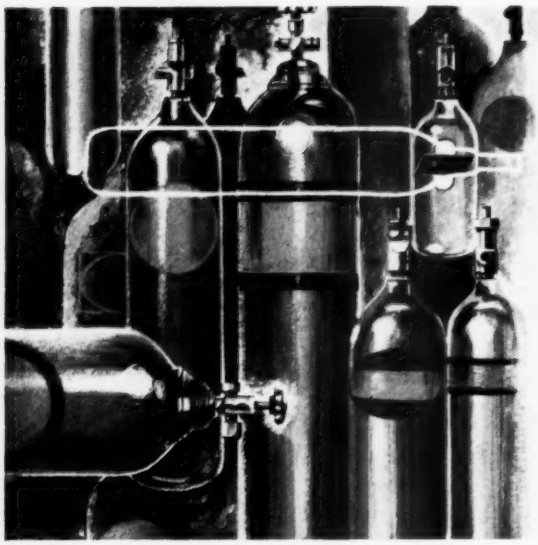

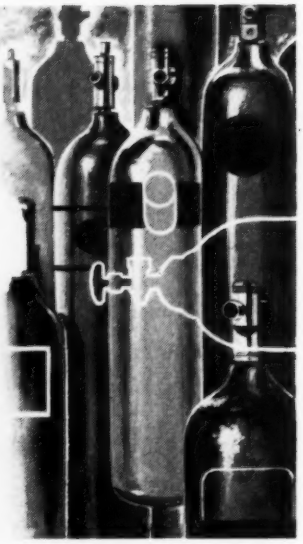

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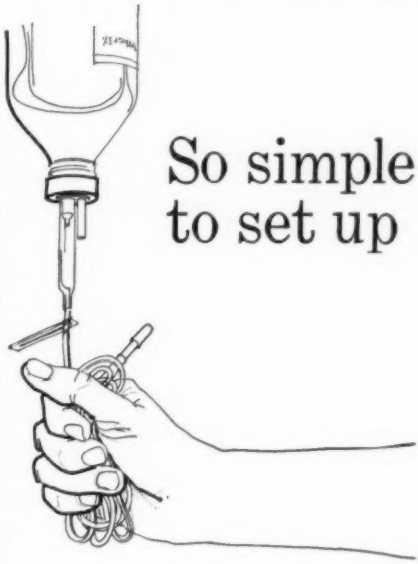

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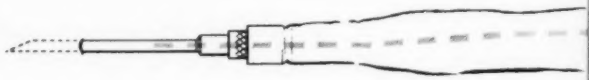

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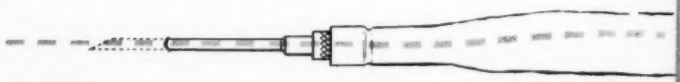

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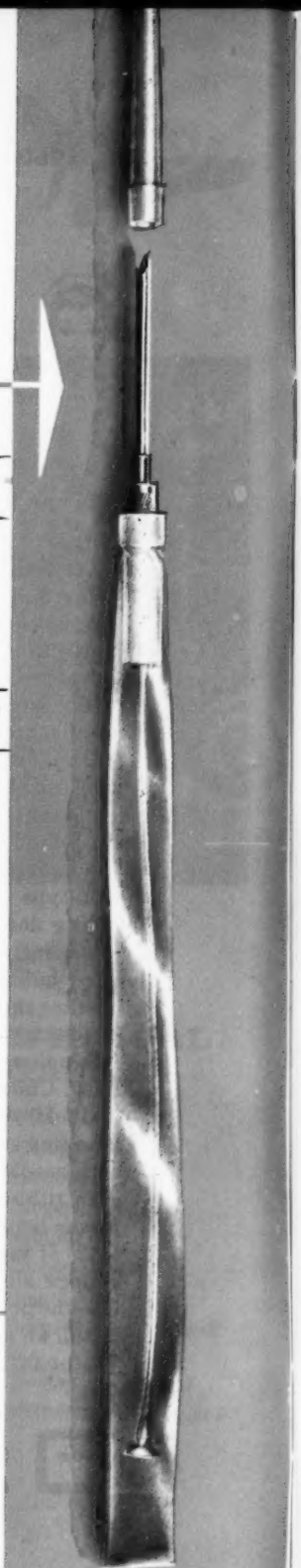

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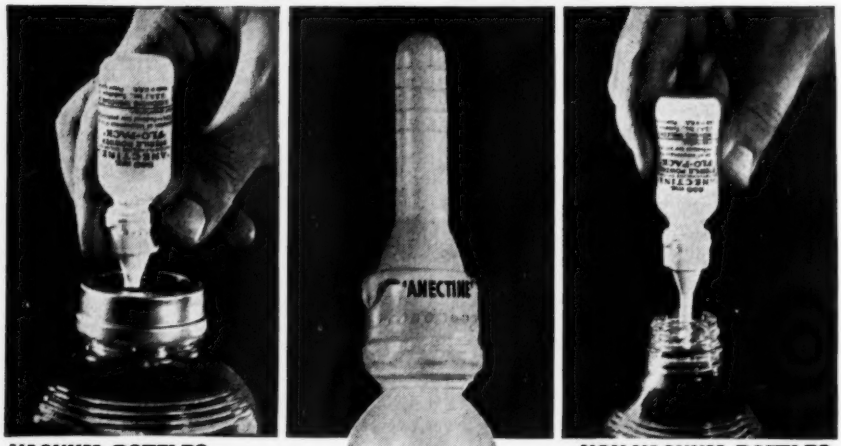

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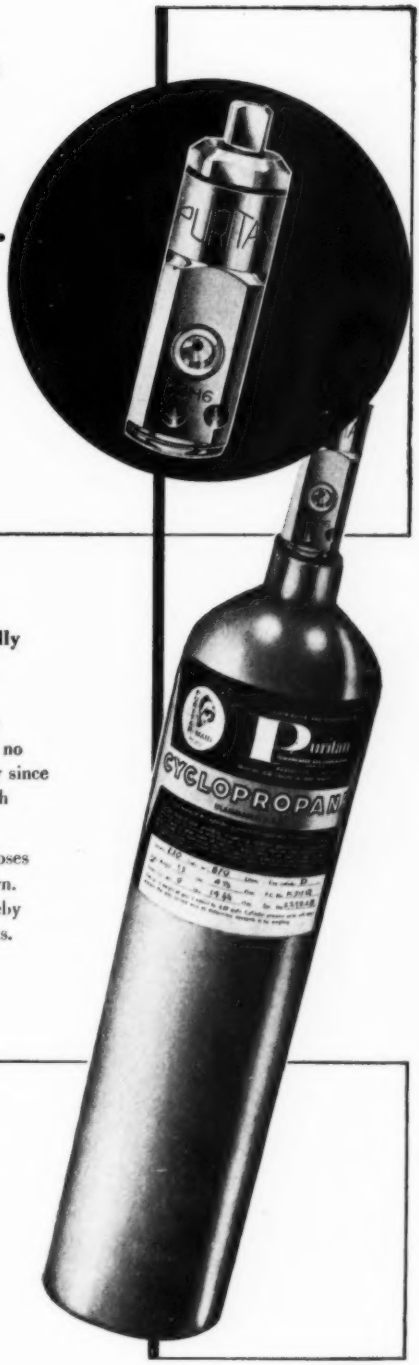

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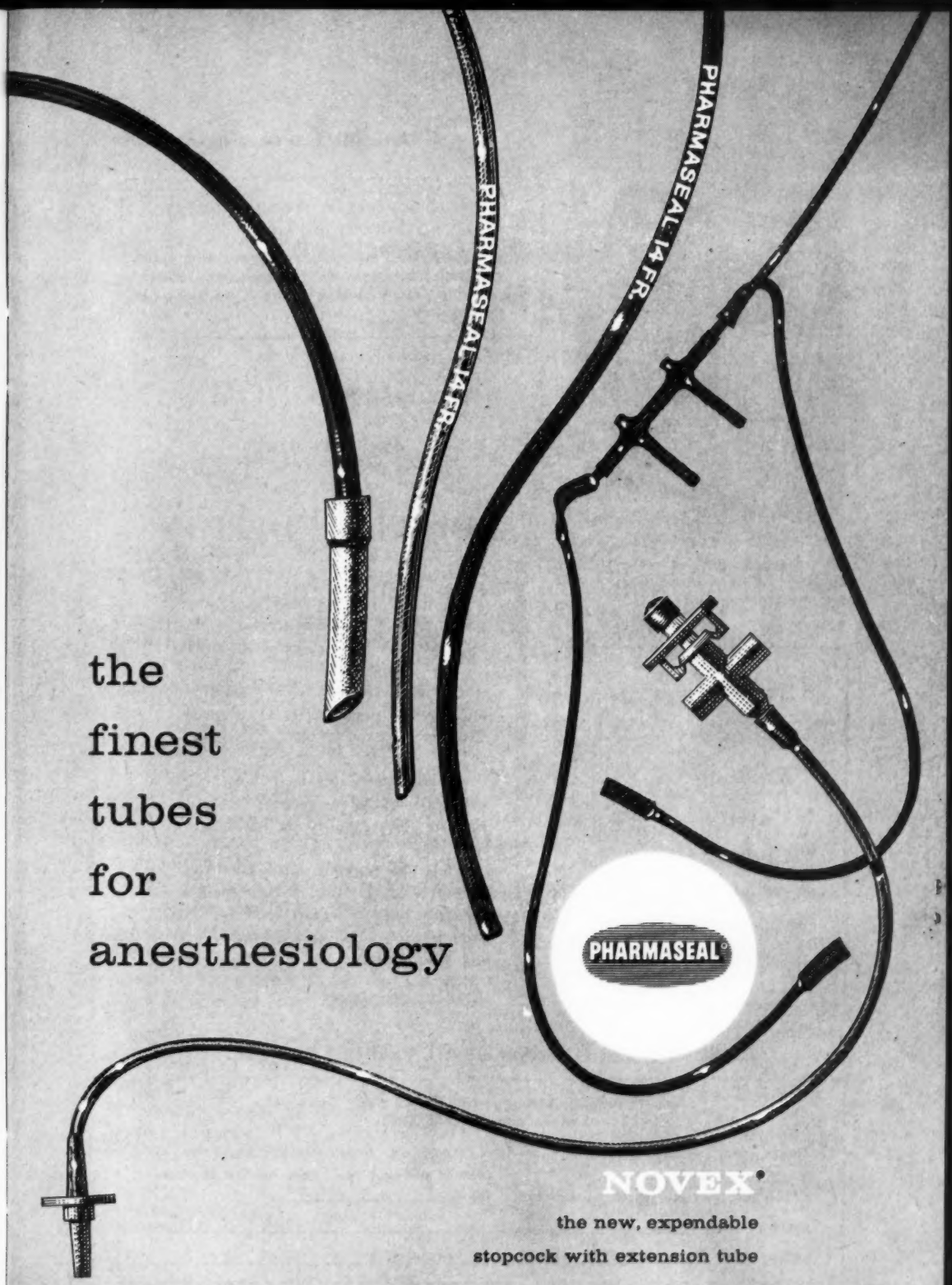

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Hypnosis in Medicine

Naif L. Simon, M.D.*
Quincy, Massachusetts

The vastness of the subject, "Hypnosis", is beyond our wildest imagination. For centuries it has been undulating between great interest and complete rejection depending on contemporary public acceptance and the credibility of the hypnotists. Since the last world war there has been a reawakening of interest which reached its peak in 1954 and since that time has remained there.

Since the act of producing the "Hypnotic State" is as ancient as time itself volumes have been written about it, both scientific and fictional, and more is being added to this voluminous literature each and every day. Not wishing to add to the already overladen libraries regarding the "History of Hypnosis" and because the techniques for inducing the "Hypnoidal State" vary with each operator, these subjects will be intentionally omitted from this discourse.

In 1955 the British Medical Society declared that the use of hypnosis for diagnosis and treatment by its members was an ethical and an accepted procedure. Subsequently the teaching of this old art was included in the curricula of medical schools in Great Britain.

In 1958, following a two year investigation study of the "Medical Use of Hypnosis", the "Hypnosis Committee" of the Council on Mental Health submitted a favorable report to the American Medical Association. At its June 1958 meeting in San Francisco, the A.M.A. openly and authoritatively accepted the use of hypnosis in medicine by its members. Since then there has been an ever increasing interest in Medical Hypnosis by the medical profession and related sciences.

I. Definition

Hypnosis has been called "Mesmerism", "Animal Magnetism", "Freudism", "Braidism", and many other names. But what it is scientifically is still a mystery, although much investigative work is being done today by the Department of Parapsychology at Duke University.

Dr. James Braid coined the word "Hypnosis". It is of Greek derivation meaning "to sleep". It must be remembered, however, that the trance-like state which outwardly resembles sleep, is physiologically different from sleep, and sleep occurs only when the command for sleep is given by the operator.

---

* Director, Anesthesia Department, Quincy City Hospital.

Presented at the annual meeting, American Association of Nurse Anesthetists, New York City, August 26, 1959.

A working definition for this phenomenon is "A State of Mind in which the factors of criticism and doubt have been removed leaving the subject in a state of increased susceptibility to suggestion and at the same time permitting selective thinking." (Simon)

The British Medical Association proposed this definition. "Hypnosis is a temporary condition of altered attention in the subject which may be induced by another person and in which a variety of phenomena may appear spontaneously or in response to verbal or other stimuli. These phenomena include alteration in consciousness and memory, increased susceptibility to suggestion, and the production in the subject of responses and ideas unfamiliar to him in his usual state of mind. Further, phenomena such as anesthesia, paralysis, the rigidity of muscles and vasomotor changes can be produced and removed in the hypnotic state".

II. Who can be Hypnotized?

Since we are all created equal, no one has any mental power over another—not even through hypnosis as most people imagine. Each individual produces his own state of hypnosis and the hypnotist, like the "Pilot Boat" directing the "Ocean Liner" into its berth, directs the subject into a preselected harbor of thinking. Therefore, because hypnosis in reality is self-induced everyone can be hypnotized at one time or another depending on a variety of circumstances. Actual percentages of people who can be hypnotized vary, depending on the section of the country where these statistics are tabulated and the type of subjects employed for the analysis. The following is a representative list of averages: (1) 80-90%—light trance can be achieved. (2) 60% — deep trance can be induced with or without regression. (3) 10% — need adjuncts such as drugs or "gimmicks". (4) Six out of eight unprepared subjects can be hypnotized without difficulty provided these subjects are willing and not coerced. (5) No percentages are available on those who can go into the state of coma through hypnosis.

Authorities state that the senile and the psychotic, because of his inability to concentrate for any prolonged period of time, cannot be hypnotized.

Children on the other hand are easily hypnotized, but cannot be maintained in that state for any length of time. This is said to be due to the very active and frequently changing mind of a child.

III. Who can Hypnotize?

As stated earlier, anyone can be a hypnotist because hypnosis is self induced. The operator can aid the subject into the hypnotic state by specific techniques. These techniques are numerous and various depending largely on the operator and the subject's response. Some cause rapid induction, others slow induction, there being no average induction time.

IV. Age Limits

It is said that anyone who can concentrate can be hypnotized, and the more intelligent one is, the easier the induction. The youngest reported age has been 18 months. There is no upper limit except geriatric senility.

V. Uses of Hypnosis in Medicine

It must be borne in mind that hypnosis is not a diagnostic or therapeutic panacea, and should be treated only as another instrument or drug in the ever enlarging medical arma-

mentarium. Each branch of medicine can derive some benefits from it. Because these uses are so numerous and would require pages to explain and elucidate, it is considered best only to outline them, leaving further elaboration to be obtained from the bibliography.

A. Hypnosis in General Medical practice:
   1. Used in the treatment of:
      a. Psychosomatic gastrointestinal, cardiovascular, and genitourinary signs and symptoms.
      b. Psychosomatic allergies and asthenic reactions.
      c. Migraine headaches; nonpathological migratory aches and pains.
      d. Nervousness.
      e. Insomnia.
      f. Nocturnal enuresis.
      g. Over eating and over smoking.
      h. Neurodermatitis and adolescent acne.
      i. Post-poliomyelitis and postcerebral accident syndromes.
   2. Used for tutoring:
      a. Subject learns more quickly and retains more under hypnosis.
      b. Remove the fear and panic of examinations.
   3. Inhibition of "gag reflex".

B. Hypnosis in Dermatology — has been successful in the treatment of:
   1. Neurodermatitis.
   2. Adolescent acne.
   3. Allergic dermatitis (teach diet control).

C. Hypnosis in Psychiatry — In this category hypnosis can play a significant role. Freud in 1919 stated that hypnosis was a short cut which can be used in psychoanalysis. Here of course "regression" is essential.
   1. Aids in the treatment of:
      (a) "Crazy mixed-up kid"
      (b) Juvenile delinquent
      (c) Drug addicts
      (d) Alcoholics
      (e) Hysteria and anxiety complexes
      (f) Stammering
      (g) Nail biting
      (h) Tics and habits

D. Hypnosis in Anesthesia:
   1. Preoperative preparation of the patient
      (a) Preoperative substitute for or adjunct to medication.
      (b) Removal of the fear of surgery, anesthesia or death.
      (c) Post hypnotic suggestion can be given for the relief of postoperative pain.
   2. As a complement or a supplement to any type of anesthetic technique.

E. Hypnosis in Surgery
   1. For differential diagnosis between psychosomatic and surgical states.
   2. Eradication of emotional factors relative to postoperative recovery.
   3. Postoperative physiotherapy — especially orthopedic (learning to use old muscles for new functions).
   4. Hypnalgesia for office surgery.

F. Hypnosis in Obstetrics and Gynecology
   1. Obstetrics—aids in:
      (a) Smoother prenatal care.
      (b) Treatment of Hyperemesis Gravidarum.
      (c) Treatment of gastrointestinal symptoms associ-

ated with pregnancy, e.g. "gas" and "heartburn".
(d) "Childbirth Without Fear" — the removal of "old witches tales" and tensions and substitution of physical and mental relaxation.
(e) Hypnalgesia for labor and delivery.
(f) Treatment of postpartum lactation syndrome.

2. Gynecology
(a) Physical and mental relaxation for gynecological examination.
(b) Treatment of premenstrual tension.
(c) Treatment of gynecological disturbances such as:
(1) Amenorrhea
(2) Dysmenorrhea
(3) Menstrual Dysfunction
(4) Metrorrhagia
(5) Frigidity
(6) Sterility
(7) Dyspareunia
(d) Treatment of pruritis ani and pruritis vulvae.
(e) Treatment of the menopausal syndrome.

G. Hypnosis in Dentistry:
1. Fear of the dentist — many patients who fear dentistry may have this fear removed through hypnosis.
2. Hypnodontia
3. Hypnalgesia for oral surgery.

The foregoing outline of the uses of Hypnosis in Medicine is intended only as a stimulus to the patient. It is hoped that the thirst for knowledge will drive him further into this field of psychodynamics.

There are no hazards attributable to hypnosis per se. Individual, social and religious codes are not broken under hypnosis. However, under hypnosis one can be "hoaxed" as easily as if he were in the normal state, but the rapport existing between operator and subject usually prevents this.

Abuses of hypnosis can and do occur. These abuses can be blamed on amateur, unethical, or incompetent hypnotists. To prevent this the following steps can be taken: (1) Hypnosis for entertainment purposes should be condemned and outlawed. (2) Hypnotists should be certified and licensed. (3) Physicians and dentists should not use hypnosis for purposes beyond their ordinary range of competence or irrelevant to their specialty, (e.g. dentists should not use hypnosis for psychiatric problems).

The aim of certified hypnotherapists, medical "Hypno-specialists", and the American Medical Association is to remove the veil of the supernatural, mysticism, and "voodooism" which has enshrouded hypnosis for centuries and to elevate it to the status of an accepted science or art.

In order to do this, several giant steps must be taken. These, though not all that must be done, include: (1) Establishment of teaching centers for hypnosis under responsible dental and medical direction, e.g. medical and dental schools. (2) Teaching programs should be integrated with medical subjects and not limited to techniques of induction alone. (3) Indications and limitations of hypnosis within a specialized field should be stressed. (4) Emphasis should be placed on the awareness of the complex nature of the hypnotic phenomena.

Some steps have already been taken by some eminent physicians

and dentists towards the advancement of medical hypnosis. These include itinerant groups of qualified professional medical personalities called "Seminars in Hypnosis" who set up lecture-demonstrations teaching at various medical centers throughout the country. Others have initiated courses in medical and dental schools, and still others have initiated extensive research programs at some of our large universities (e.g. Duke University) in the field of psychological and parapsychological sciences.

With the acceptance by the medical profession of this old art, we shall see in the not too distant future, acceptance of hypnosis by the laity, and there then will be opened to everyone new horizons of aid for many of the ailments which have beseiged mankind and which heretofore have been treated by multicolored tablets, liquids and "tranquilizers."

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Hypothermia and Anesthesia

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Foreword

The relationship between temperature and physiologic function has always been a matter of great interest to scientist and layman alike. The intriguing differences between species wherein the fish, the snake and the lizard are unable to control their body temperatures but the bird and mammals have achieved this capacity within a very wide range and the occurrence in nature of the amazing versatility of the true hibernator—a normothermic mammal capable of survival at biological temperature extremes—have long been the subject of fable, speculation and scientific inquiry. Recently, the pressing need for a solution to a specific problem of surgical technique, namely, how to achieve direct vision procedures within the opened heart, has served as the stimulus to revive widespread interest in hypothermia, a state in which the body temperature of a normothermic mammal is below normal. In this situation many profound changes occur in the physiology of the body. Since the possibilities of the clinical application of hypothermia have become more apparent, interest in achieving basic understanding of the process has grown.

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Introduction

From ancient times numbness has been associated with coldness of tissues. Deliberate early application of this fact to obtain anesthesia was not made because of two factors. One was that when a conscious person is deliberately cooled, the process may be painful or at least disagreeable. The other factor was that when tissues are cooled by existing in a medium colder than the freezing point of blood, the cells of the tissues were likely to be frozen or injured so that the anesthesia was obtained only on payment of too high a physiological price.

Hypothermia may be defined as a state of body temperature which is below normal in a normothermic individual.

Hypothermic anesthesia is herein regarded as analgesia and the loss of consciousness due to cold.

Clinical Uses

Early work has been done by Fay, Talbott and McQuiston, along with the experimental work of Bigelow and associates. There are many fundamental investigations that have been done in hypothermia, as reviewed by Virtue, Lewis, Swan and associates, who have done experimental work and used hypothermia for open heart surgery.

At present it is generally understood that "modified" hypothermia includes temperature ranges down to 90° F. "Deep" hypothermia is reserved for temperatures below 78° F., and is used today mainly with experimental animals. As a relative term "hypothermia" covers that temperature range in between these extremes. "Induced" hypothermia implies artificial production of lowered body temperature as it is clinically produced in contrast to the natural hibernation of some animal species.

Hypothermia can be produced by: 1. Cooling of the diverted blood stream. 2. Cold fluids given intravenously. 3. Gastric, intraperitoneal and intrapleural lavage. 4. By the use of drugs, and 5. By surface cooling with immersion, cold chambers, ice packs, or thermal blankets.

At present the fastest method is by immersion in water. Another method of induction is by use of the thermal blanket in conjunction with ice packs. The blanket is by far the most convenient since it does not delay the beginning or conclusion of the surgical procedure; it is easily operated by the anesthetist without interfering with his other duties. The blanket is equipped for both cooling and warming and is technically easy to control.

There are many factors that determine body temperature during normothermic anesthesia and which may play a role in the speed and safety of induction of hypothermia. Environmental factors include the patient's own temperature, the room temperature, the effective circulating air velocity and the room humidity. The old and the young are profoundly affected by temperature changes—there are natural fluctuations in the temperatures of children, there is a lack of insulation in children, their surface area is smaller and the very young lack the ability to shiver. Both the young and aged lack compensatory mechanisms. Weight and hydration of the patient have some effect. It is more difficult to cool the obese person. The dehydrated patient is unable to lose heat through perspiring.

The biological properties of cold are many and are just now being evaluated. Cold can in itself produce narcosis and death. On the central nervous system it produces amnesia, loss of memory, irrational behavior and unconsciousness. While the normothermic spinal cord can survive thirty minutes occlusion time, the hypothermic kidney and the spinal cord do well up until two hours. With deep hypothermia the brain circulation can be occluded for fifteen minutes.

Cerebral blood and cerebral oxygen consumption are reduced in a linear relationship with the falling temperature. Electrical activity of the brain ceases at 68° F. There are various figures given to indicate when narcosis ensues with cold, some as high as 90° F., others as low as 84° F. Hypothermia has its most striking effects on the myocardium and circulation. It both benefits and hinders the myocardium. The resulting hypotension and increased blood viscosity reduce the coronary blood flow, but the lowered metabolism of the heart muscle, the lessened cardiac work and the increased time for unimpeded coronary influx, benefits the myocardium. With hypothermia the reduction in cardiac output is greater than the reduction in coronary flow, resulting in an actual increase in the coronary fraction of the myocardial

output. The hypotension that accompanies hypothermia is not a manifestation of heart failure but is due to the reduction of cardiac output. The profound changes are noted in the systolic-diastolic ratios.

Oxygen consumption is likewise progressively reduced with the fall in body temperature, experimentally sometimes amounting to 84%. Tissue hypoxia does not occur with this since there is no increased oxygen demand on rewarming. Oxygen becomes more soluble at colder temperatures.

Respiration in hypothermia is markedly affected. There is sometimes an initial rise in the rate depending upon the depth of anesthesia, but this gives way to a gradual but steady drop. Spontaneous respirations cease at 82.4° F. Hypothermic effects on the liver and kidney are apparently secondary to the fall in cardiac output. There have been instances of albuminuria, but there is no good evidence of residual change in renal function during repeated exposures to cold. Body metabolism is reduced approximately 5% per degree of fall in body temperature. Body chemistry apparently is altered to some extent during hypothermia but current studies are as yet inconclusive. It is known that glucose metabolism is suppressed, and profound changes occur in potassium and CO_2 levels but at present these findings are controversial. There is an increase in the bleeding and clotting times.

Paradoxically, in spite of the suppression of various organs and body systems, there is no change in resistance to, or in serological defenses against infection.

Muscular activity as manifested by shivering, plays an important role in hypothermic anesthesia. The shivering may be very marked or merely occult and seen only with or by electromyography. Shivering is a reflex reaction stimulated by a lowered blood temperature or locally applied cold sufficient to lower the blood temperature. When the blood temperature falls as little as 1/2° C., further cooling is arrested by shivering. Shivering is rhythmical, well coordinated contractions of voluntary muscle capable of increasing heat production as much as 400%. It becomes important in hypothermic anesthesia because it makes cooling difficult and increases the demand for oxygen as much as 200%. Cardiac output is increased during the shivering phase, but in the absence of shivering it decreases in direct relation to the decrease in temperature.

Ventricular fibrillation is responsible for hypothermic death. The myocardium is more sensitive to mechanical stimulation during hypothermia and responds to intracardiac catheters by ventricular fibrillation. This has been a major cause of death during the clinical use of hypothermia during cardiac operations. Clinical investigators have found that an increased arterial carbon dioxide content and combination of potassium in the serum may be associated with fibrillation and have had some success in preventing this syndrome by treatment of hyperventilation and by intracardiac potassium. During shivering the need for and consumption of oxygen increase markedly.

Since hypothermia has profound depressant effects on all body systems and there are certain critical temperatures at which body functions are either altered or cease altogether, a knowledge of the correct body tem-

perature must be known at all times during the course of induced hypothermia. Thermo-couples using the rectum, esophagus, or intravascular routes may be employed. Actually, for modified hypothermia a simple clinical thermometer placed in the nares or the mouth is sufficient since there are no critical changes in the safe temperature range. The anesthetist will also discover that the introduction of chilled blood affects the degree of temperature during hypothermia.

Dangers

Hypothermia when properly used has been proven safe. However, it is not without its inherent dangers. These are: 1. Overdose of anesthesia in the presence of depressed body function. 2. The use of improper or rapid changes in body temperature, and 3. Cardiac irregularities.

The first two are rapidly eliminated from the picture with the advancement of the skill of the anesthetist. There is uniform agreement that the hypothermic heart is prone to fibrillation. There are three critical periods at which this is likely to appear:

1. When the body temperature is lowered below 26° C.
2. During manipulation of the heart itself.
3. Immediately upon restoration of circulation to the occluded heart.

Some workers believe there is increased irritability of the pacemaker and conductive tissue. Manipulation of the heart may be classified as local trauma. A rapid change in tissue pH may give rise to difficulties when the circulation is returned to the occluded heart. The rapid change in pH is best controlled by vigorous hyperventilation and by a slow return of blood to the occluded heart. Treatment of fibrillation during hypothermia is purely prophylactic. It can be successfully treated with the infusion of potassium or acetylcholine into the coronary circulation. Electrical defibrillation and epinephrine are contraindicated. Cardiac asystole may occur. Massage, the injection of calcium chloride, and rewarming will restore the occluded heart. Due to the prolonged relaxation time, epinephrine is contraindicated and leads to irreversible fibrillation.

The future role of hypothermia may be extended beyond its present use which has centered mainly on cardiac and neurological surgery. There are five broad areas in which it may be found useful. These are outlined in table 1.

Technique

The method of inducing hypothermia consists of slow cooling by means of the Thermorite blanket and refrigeration unit. This has the disadvantage of taking much longer to reduce the temperature while the patient is under anesthesia but has a very obvious advantage of being extremely easy to handle and requiring less manipulation of the patient.

The technique of hypothermic anesthesia is not difficult. The induction of anesthesia is the same as normothermic anesthesia. The chief difficulties arise with the onset of cold below the modified range, at which time practically all anesthetic agents can be eliminated for the duration of the procedure. Even the modified ranges allow for all of the advantages of cooling, mainly, smooth anesthesia, lessening of anesthetic agents needed, lessened likelihood of shock and decreased operative bleeding.

TABLE 1

I. To reduce oxygen need in conditions causing hypoxia.
   A. Acute pulmonary diseases.
   B. Pulmonary, cerebral, peripheral embolus.
   C. Acute anemia.
   D. Congenital cyanotic heart disease.
   E. Lower nephron oliguria.
   F. Deliberate interference of circulation.
      1. Cardiac surgery.
      2. Regional surgery.
         a. Hepatectomy.
         b. Aneurysm.
         c. Visceral excision.
         d. Carotid artery.

II. To reduce blood pressure or produce physiological hypotension.
   A. To diminish operative hemorrhage.
      1. Brain.
      2. Fenestration.
      3. Massive skin grafting.
   B. To reduce internal hemorrhage.
      1. Duodenal ulcer.
      2. Ruptured Esophageal varices.
   C. To counteract hypertensive crisis.
      1. Encephalopathy.
      2. Eclampsia.

III. To reduce oxygen need and produce physiologic hypotension.
   A. Shock.
      1. Traumatic.
      2. Septic.
   B. Myocardial infarction.

IV. To combat hyperpyrexia.
   A. Thyrotoxicosis.
   B. 3rd ventrical hemorrhage.
   C. Heat stroke.
   D. Severe infection.

V. Thermo-nuclear warfare. (Presently being investigated.)

In induced hypothermia, the temperature slows the rates of all processes and modifies the action of metabolites and other substances. This in itself is not necessarily harmful, as shown by the true hibernator, but will become disastrous as soon as anoxia and chemical imbalance begin to develop. The basic physiochemical considerations in hypothermia thus relate to the laws governing the dependence of cellular activities and their enzymatic reactions on temperature, ions, metabolites and drugs. Of particular importance are such cellular phenomena as excitability, rhythmicity and contractility. In regulating the oxygen transport these can act interdependently, since their specific rates are set at complementary levels. When the temperature is lowered, the rates are reduced in accordance with the temperature coefficients of the respective processes. In both the true hibernator and the nonhibernator there is every reason to expect comparable values for the temperature coefficients of the cellular reactions.

In hypothermia considered at the cellular level, the impairment of any cellular activity arises when the energy essential for function is impaired either by the primary cause of anoxia

or the secondary cause of an insufficient electrolyte balance across the cell membrane, both stemming from an inadequate composition of the extracellular fluid.

Respiration

Considerable attention has been given to the problem of spontaneous versus controlled respiration. Oxygen consumption in relation to body temperature does not appear to be affected by the mode of ventilation of the lungs. Oxygen supplies to the tissues apparently are adequate in either instance. The major point of controversy hinges not upon metabolic differences but upon the relative incidence of ventricular fibrillation observed. The shift to the left of the oxygen dissociation curve with lowered blood temperatures is not as disastrous an event as many investigators have believed. Concomitant with this tendency, accumulation of CO_2 has been demonstrated to result in a respiratory acidosis. This state of acidosis results in a shift of the oxygen dissociation curve to the right.

Three methods of inducing hypothermia in man have received the most attention, i.e., 1. Use of drugs alone, 2. Application of cold to various body surfaces, and 3. Cooling of blood removed from and subsequently returned to the body. It is evident that no single drug or group of drugs has produced a significant lowering of body temperature without added cold. Neither Thorazine,® Phenergan® or Demerol,® alone or in combination, have caused significant hypothermia. Some of all of these substances are of value as adjuncts to cooling, but none can stand as a primary agent. Direct cooling of blood appears to produce a more rapid reduction of body temperature in adults than does any method of surface cooling. Direct blood cooling is also alleged to be associated with less compensatory shivering and vasoconstriction. Damage to skin, subcutaneous tissue and peripheral nerves are infrequent with this method in comparison with surface cooling.

There is little agreement as to prehypothermia sedation, the anesthetic

TABLE 2

Formula for Conversion

$$100^\circ \text{ C. to F.}^\circ - \frac{100}{} \times \frac{9}{5} = 180 + 32 = 212^\circ \text{ F.}$$

$$100^\circ \text{ F. to C.}^\circ - \frac{100}{} - 32 = 68 \times \frac{5}{9} = \frac{340}{9} = 37^\circ \text{ C.}$$

TABLE 3

Scale: Fahrenheit	Centigrade
98.6	37
97	36
96	35.5
95	35
94	34.5
93	34
92	33
91	32.5
90	32.2
89	31.5
88	31
87	30.5
86	30
85	29.5
84	29
83	28.5
82	28
81	27.2
80	26.5
79	26
78	25.5
77	25
76	24

agents and techniques, or the muscle relaxants which are preferable as cooling is induced. Substances which are destroyed in the body will tend to accumulate as body temperature falls, since detoxication mechanisms are depressed.

Conclusion

We thoroughly agree with others who have obtained good results by means of hypothermia and on predictions for its future in the surgical treatment of cardiovascular diseases. The clinical application of controlled hypothermia is based on the fact that all biological processes depend on temperature. These conditions should be less dangerous to the patient during the additional strain of an operation if his oxygen requirement is reduced to a minimum, due to a considerable lowering of the temperature.

Induced hypothermia in humans should be limited to a temperature not lower than 25° C. and for not more than six hours.

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Fluothane: a clinical evaluation

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Should you ask an anesthetist his opinion of any anesthetic drug, his answer would depend on his individual results when he has used the various anesthetic agents and techniques. The agents which we, individually, consider "best," are those with which we are most familiar, administer with the greatest ease, and which afford the patient the greatest safety in combination with providing the surgeon with the best possible operating conditions. Those of us in the field of anesthesia are constantly searching for the ideal anesthetic agent, with which we can vindicate our strong moral obligation to relieve pain so that the patient can tolerate surgical procedures with maximum safety, both during and following surgery; so far, no drug can be classified as "ideal" in all respects. It is my purpose today to attempt to evaluate one of the newer agents, Fluothane, on the basis of personal experience with its use.

Many times it is difficult to perform our duties within the confines of good judgment and safety, because of the fact that any one anesthetic agent does not possess all of the ideal properties which would render the administration of anesthesia without danger to either the patient or the operating room personnel. We should evaluate each drug on the basis of the toll it takes. For example, should we feel justified in sacrificing the maintenance of good vital signs, such as blood pressure, pulse and respirations, so that the electric cautery can be used, or, is it possible to use non-explosive agents and still maintain vital signs without having to resort to artificial means of supporting them? This is one of many decisions we must make in the choice of an anesthetic agent, and, as you all know, our lives would be made much easier if there were one specific drug which could fulfill all requisites.

Today Fluothane is being widely discussed, being one of the newest agents, and has rapidly assumed an important place in anesthesia. It was first introduced in America in 1956, and its use advanced in great strides because of the fact that it is one of the few agents which is not flammable or explosive, can be administered by inhalation technique, so is more readily reversible than the administration of intravenous barbiturates. The explosion rate from anesthetic administration in this country, is about 1 in 100,000 anesthetics, which, in my mind, is a very low figure, but ominous enough to curtail

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the use of electrical apparatus by many surgeons when they definitely felt that it was indicated. For this reason, there is much to be said in favor of any agent, such as Fluothane, which eliminates the explosion hazard.

Fluothane is an extremely potent anesthetic agent; it is four times as potent as ether, and two times as potent as chloroform. Today everyone seems concerned with producing sleep, whether it be for the every day need for a certain amount of rest, or for the relief of pain in the field of anesthesia. It has become an increasingly difficult task to put the American Public to sleep; tranquillizing drugs, sleeping pills and shorter working days have not been the answer, so that frequently more potent anesthetic agents must be employed to overcome "drug tolerance" which has been developed by the sleep resistant patient. Fluothane provides a fast induction, usually requiring from two to three minutes, with a minimal excitement phase. When preliminary induction with intravenous barbiturates is desirable, a small amount of 100 to 200 mgm. is a safer dose than larger amounts, which may depress respiration and circulation. The innocuous effect of Fluothane on the respiratory mucosa offers a great advantage over some of the other more irritating agents. It does not stimulate the flow of mucus secretions, and seems to render the laryngeal and pharyngeal reflexes less sensitive. Even the emphysematous and asthmatic patients tolerate inhalation of Fluothane with very little resistance, and breath-holding is uncommon. However, Fluothane is a marked respiratory depressant. Because of this fact, *extreme caution* should be taken, first, to avoid high concentrations of the drug, second, to avoid "pushing" the anesthetic to the already heavily narcotized patient, and third, to prevent the need to control respirations.

All measures should be utilized to maintain an adequate tidal volume of respiration, either by the use of low concentrations of Fluothane, or by assisting respirations. Tachypnea is not uncommon during Fluothane anesthesia; it may be the physiological response to depressed tidal volume, or to surgical stimulation, but it should not be allowed to persist; assisted respirations should always be employed when necessary to maintain an adequate ventilation. Should apnea occur, it can be easily reversed by discontinuing the administration of Fluothane and the administration of oxygen until spontaneous respirations are resumed. The use of the high liter flow, with partial rebreathing, is recommended, to avoid high concentrations of the drug.

Bradycardia may occur in some patients, especially when excessive dosage has been given, but will frequently respond to reduction in anesthetic concentration, or the administration of atropine sulfate by the intravenous route.

One of the most common complications observed with the use of Fluothane is hypotension. This, too, seems to be related to the use of high concentrations, and more especially if the agent is "pushed" to the patient. This decrease in blood pressure may be attributed to any of several factors: (1) peripheral vasodilatation, (2) myocardial depression, (3) vasomotor depression, and (4) ganglionic blocking effect. Since we are all aware that many times the amount of anesthetic agent required to adequately anesthetize a patient

may cause cardiovascular depression, we should be forewarned of the dangers of early hypotension, and perhaps choose an agent with a greater margin of safety for the patient who cannot tolerate sudden reduction in blood pressure. It has been my experience that any patient whose blood pressure has been considerably lowered by normal amounts of preoperative medication, is not a good candidate for use of anesthetic agents which consistently cause hypotension in anesthetic concentrations. Young, healthy individuals do not exhibit this hypotensive reaction to Fluothane, unless they have a marked reduction in circulating blood volume.

Since loss of normal blood vessel tone seems to be a complication with Fluothane, even in light planes of anesthesia, great caution should be exercised in effecting changes in the patient's position, to obviate positional hypotension.

Nausea and vomiting are not common during, or following, Fluothane anesthesia. Recovery time is short, and most patients respond as if from a normal sleep, in a matter of minutes. As far as is known at the present time, liver and kidney function are no more affected by Fluothane than with any other anesthetic agent. Likewise, blood sugar is not changed to any appreciable degree.

We have been using Fluothone at the Cincinnati General Hospital since January of 1958, on all age groups, from pediatric to geriatric, and for all types of surgical procedures. At first, we used it with the open drop technique, and had good results, but due to the lack of control of concentration and narrow margin of safety with such a potent drug, we now confine its use to administration through a finely calibrated vaporizer attachment. Most of the patients selected for the use of Fluothane were scheduled for operative procedures in which nonexplosive anesthetic mixtures had to be used, asthmatics, and patients with emphysema, or other forms of chronic lung disease. We have also found Fluothane to be of value for patients who have recently ingested food or drink, because of the fact that nausea and vomiting are not usual complications. It has proven to be a good agent for individuals who show the unmistakable signs of fear and stress, with marked elevation of blood pressure and pulse rate. Children do well with a Fluothane induction because it has enabled us to place a pharyngeal airway in a lighter plane, with minimal mucus secretion, which so often complicates induction with ether or Vinethene; this makes for a smoother maintenance and recovery. Following surgery of the face, head or neck, when it is always desirable to have the patient in a state of consciousness, with reflexes active, and without nausea and vomiting, we have found that Fluothane is a valuable drug to achieve this.

It is not possible to overemphasize the extreme potency, and the narrow margin of safety inherent in this agent. Fluothane should never be used indiscriminately. It is a very valuable drug that should be used when it is indicated, always weighing its advantages against its contraindications. Although I do not feel that Fluothane is the answer to the perfect anesthetic agent, I am certainly of the opinion that it has a great potential in the field of anesthesia.

Vaporizers for the administration of Fluothane can be obtained to deliver concentrations of from 0.5% to

4% vapor, by volume, at different gas flow rates. These vaporizers are calibrated at 0.1% intervals. It can also be administered in the copper kettle of the Foregger gas machine, or the Heidbrink Vernitrol (without the need for a vaporizer attachment), although the concentrations are more difficult to control. I, personally, prefer the type of vaporizer which will deliver 0.1% to 4% Fluothane vapor within a gas flow range of 2 to 10 liters, without altering the selected concentration, at a constant temperature of 75 degrees; temperature is maintained by an automatic compensated valve.

We have achieved satisfactory results with adults by vaporizing Fluothane with a flow of nitrous oxide and oxygen, utilizing the partial rebreathing technique. We usually use 2 liters of nitrous oxide and 3 liters of oxygen, adding the Fluothane vapor slowly, as it is tolerated by the patient, through a calibrated vaporizer of the type mentioned above, until we have achieved a concentration of 2.5% and maintenance is reached; we then reduce the concentration as low as is compatible to maintain a surgical plane of anesthesia. The average vapor concentration required for most patients has been 0.8%, when succinylcholine is used as a relaxant. For children, we prefer using a non-rebreathing, mask and bag technique, vaporizing the Fluothane with nitrous oxide and oxygen; we have found this to be a safe and rapid method for induction. Any patient who has manifested toxic reactions to Fluothane, such as marked hypotension, arrhythmia or respiratory depression, has been switched to another anesthetic agent.

It might be well to mention, in closing, the curares, epinephrine and prolonged administration of tranquilizing drugs produce harmful effects when combined with Fluothane anesthesia; succinylcholine is the relaxant of choice, and may be used when any marked degree of relaxation is required.

To summarize, Fluothane offers a rapid, smooth induction of anesthesia, reduction of salivation, good control of vapor concentration, quick recovery time without excitement, reduction of the incidence of nausea and vomiting, and is a controllable, volatile, potent, nonexplosive anesthetic agent.

The Use of Vasopressor Drugs in Anesthesia

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Introduction and History

The vasopressor drugs are very important therapeutic tools in anesthesia. Like all other tools, they can be used skillfully to do a good job, misused to do a bad one, or not used when they should be.

One of the oldest remedial drugs in medicine, dating from antiquity, is a vasopressor still widely used in anesthesia: ephedrine. This is the active principle of the oriental drug *ma huang* (yellow astringent), used as a circulatory stimulant for 5,000 years.

Just before the turn of the century Oliver and Schafer made important observations on the effects of adrenal medullary extract upon the cardiovascular system, thus having opened up a whole new field of pharmacological investigation. In 1894 they injected animals with medullary extract and noted an enormous increase in arterial blood pressure, arteriolar vasoconstriction, and an augmented heart action. The active substance of the adrenal medulla was isolated and named adrenaline or epinephrine. This was the first hormone to be crystallized in pure form.

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Chemistry

Nearly all of the therapeutic vasopressor agents have similar chemical structure. In 1914, Barger and Dale performed a monumental scientific study in which the actions of a number of vasopressor drugs were correlated with their chemical structures. These compounds were christened *sympathomimetic amines*, indicating that the amino radical is the essentially active portion of the molecule and that these drugs mimic stimulation of the sympathetic nervous system. Some of the drugs in this work done over fifty years ago have only recently been introduced into clinical medicine. Variations in activity are due to specific differences in molecular configuration.

Pharmacology

These drugs act not on the sympathetic nerves, but directly upon the effector cells. Epinephrine and its congener, norepinephrine have been identified as the chemical mediators released at the nerve endings upon sympathetic nervous system excitation. These in turn activate effector cells in the blood vessels, gut, bronchi, iris, myocardium, secretory glands, muscles of the hair follicles, and the central nervous system; they also stimulate the release of glucose into the blood stream from the various glycogen reserves.

All the sympathomimetic amines have qualitatively similar effects, although selectivity in their various actions exists, thus providing a variety of agents to be used for different purposes.

Epinephrine and norepinephrine are the most potent of the clinical vasopressors, but are also the most fleeting in length of action. This is due to rapid enzymatic neutralization. The longer duration of ephedrine and other vasopressor drugs is due either to their less rapid degradation in the body or to their inhibitory effect on the normal catalytic inactivation of the humoral mediators, epinephrine and norepinephrine.

Epinephrine and norepinephrine exert prompt, short-lived effects; hence, repeated doses are required. A spiking blood pressure response similar to a septic temperature curve results, most pronounced where vasomotor instability exists, as in chronic hypertension or hypotension. Untoward effects subsequent to the use of these agents are: pounding headache, tremors, palpitation, pallor, jitteriness, anxiety, cardiac irregularities, goose flesh, chilly sensations, etc. This syndrome is experienced by people during emotional stress situations such as a near automobile collision, heated argument, robbery or war-time bombing attack. This is the result of the endogenous release of epinephrine from the adrenal gland.

Uses and Preparations

Formerly epinephrine was used to support the circulation during spinal anesthesia and traumatic shock, but it also produced the adverse side effects already mentioned. The first suitable substitute for epinephrine was ephedrine. Although not as abrupt in its excitatory effects, this drug exhibits similar side actions such as anxiety, tremors, nervousness, palpitation, tachycardia, etc. Furthermore, ephedrine is unique among the vasopressors in that rapid tolerance develops, so that repeated doses produce less and less response; this is known as tachyphylaxis. It causes considerable psychic stimulation which is the basis for its combination with other drugs such as the antihistamines which produce undesirable cortical depression.

Epinephrine, norepinephrine, and to a limited extent, ephedrine, sensitize the heart to certain anesthetic agents such as cyclopropane, Fluothane, trichlorethylene, ethyl chloride and chloroform, thus setting the stage for fatal arrhythmias. Many vasopressors are available which can be used safely with these anesthetics: phenylephrine (Neosynephrine), methoxamine (Vasoxyl), desoxyephedrine (Desoxyn or Methedrine), mephentermine (Wyamine), cyclopentamine (Clopane), metaraminol (Aramine), etc. Bradycardia occurs with these as a result of vagal reflex action and can be successfully blocked by therapeutic doses of atropine. These are all useful drugs and it is well for the anesthetist to become familiar with several so that rational administration and proper dosage will be achieved.

Two mechanisms are normally operative in the rise in arterial blood pressure following the injection of a vasopressor: 1. A central stimulating effect on the myocardium which results in an increased force of ventricular systole. 2. A vasoconstrictive effect which increases the peripheral vascular resistance to the flow of blood. The most noteworthy exception to this is norepinephrine (Arter-

enol) which is the most powerful vasoconstrictor known. This drug has little or no excitatory effect on the myocardium, hence cardiac work is increased, but not the cardiac output.

The prime indication for the use of a vasopressor is the reversal of hypotension due to neurogenic factors: sympathetic nervous system paralysis following the use of spinal or epidural anesthesia, or that occurring from excessive or prolonged effect of the ganglionic blocking agents used to deliberately produce hypotension during surgery; overdose of sedative drugs before, during or after anesthesia; overdose of anesthetic agents; adverse reactions to drugs of any kind; traction reflexes during operative manipulation; psychogenic shock such as fainting during regional anesthesia; and other related causes.

Hypotension subsequent to the loss of circulating blood volume is not an indication per se for the use of vasoconstrictors. The cardiovascular system has already undergone compensatory changes and to stimulate further vascular tone is to whip a tired horse. However, vasopressors should be used when hypotension persists after adequate blood replacement. For immediate effect the intravenous route should be used. For sustained action further doses can be given subcutaneously or intramuscularly, or intravenously by means of an infusion containing the drug in dilute concentration which can literally be titrated against the blood pressure response.

Postanesthetic hypotension is similarly treated. This complication may be due to factors other than blood loss: neurogenic factors already mentioned, pain, drugs such as the phenothiazine derivatives (Thorazine, Sparine, Phenergan), and frequently the rapid elimination of carbon dioxide accumulated as a result of hypoventilation during anesthesia.

Allergic reactions such as hives, erythema, hypotension, bronchospasm, rhinitis, etc., respond with varying degrees of success to sympathomimetic drugs, although these have been largely supplanted by the use of more specific remedies such as the antihistamines, and in extreme cases, by the administration of the corticosteroids. Bronchial asthma is often ameliorated by vasopressors; the time-honored treatment during anesthesia is the addition of ether which is itself a sympathomimetic agent.

Depressed patients in the recovery room frequently respond soon after the use of such centrally active vasopressors as desoxyephedrine.

Epinephrine is a powerful cardiac stimulant and should be included in every emergency kit for use in cardiac arrest.

Epinephrine is used to prolong the action of local anesthetics; the optimal concentration is 1:200,000. Rather than relying upon drops, the size of which can vary enormously depending on whether a medicine dropper or a hypodermic needle is used, epinephrine should actually be measured when added to local anesthetic solutions, and the total amount should never exceed 0.5 c.c. So-called local anesthetic reactions in the dental chair are usually reactions to epinephrine used in excessive concentrations. Vasoconstrictors added to spinal anesthetic solutions have no systemic effect since absorption from the subarachnoid space is too slow.

Contraindications and Precautions

Patients with heart disease, hypertension and hyperthyroidism should be given vasopressor drugs with extreme caution. The safest procedure is to use a minimum dose diluted in a syringe and give in small increments until the desired response is obtained. When a vasopressor has been given previously by another route, a subsequent intravenous dose should be very carefully and slowly injected to avoid an overwhelming response due to suddenly increased absorption by the improved circulation.

Similarly, when epinephrine has been used in a local anesthetic, great care must be taken in the use of vasopressors to avoid additive effects.

Cocaine is a sympathomimetic drug and will strongly potentiate the action of vasopressor drugs.

Oxytocic drugs used by the obstetrician may produce an exaggerated response in the blood pressure when followed by the injection of vasopressors.

Norepinephrine in very dilute infusion solutions has been used to treat refractory hypotension. It is very difficult to wean patients away from it. In addition it tends to produce severe ischemic necrosis locally and along the site of the vein. In case of extravasation one of the adrenergic blocking agents such as piperoxine or phentolamine (Regitine) should be infiltrated into the area immediately to prevent slough. Other vasoconstrictor agents should be used preferentially to avoid these problems.

As mentioned in the beginning, the vasopressor drugs are important and powerful therapeutic tools, but they are double-edged and can be beneficial or detrimental, depending on the way in which they are handled.

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Survey of Nursing Anesthesia:

personnel, policies, and procedures in Minnesota hospitals, 1956-1957*

Part I

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Introduction

Nearly everyone during his lifetime may find it necessary to be admitted to a hospital for care. Of all hospital admissions over one-half of the patients require anesthesia services for surgery, obstetrics or inhalation therapy. This was found to be true in a national anesthesia study[1] made in 1950 which estimated that over 50% of patients admitted to hospitals required anesthesia services. To further substantiate this fact, the data taken from the nursing anesthesia survey of Minnesota hospitals in a one year period, 1956-1957 showed that 42% of admissions were surgical and 17% were obstetrical patients.

The quality of anesthesia service is therefore of interest to patients as well as to all hospital personnel, but it is of prime concern to the anesthesia personnel. To provide and constantly improve such services in the face of assumed staff shortages requires planning based on precise information regarding personnel, equipment, facilities and procedures in the anesthesia departments of hospitals.

To secure such information for the State of Minnesota, the survey reported here was completed. The ultimate objective of this survey is the

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improvement of anesthesia care of hospital patients. The first step necessary toward such improved patient care is a clear picture of present conditions. Such knowledge together with recommendations will enable those in positions of influence to guide the development of anesthesia services in ways that may be indicated. In addition to identifying areas of concern, the establishment of baseline data for a given time will allow comparisons in the future which will indicate what progress may have been made toward improved anesthesia services.

The research study is partly an outgrowth of an earlier program of training and recruitment activities supported by the W. K. Kellogg Foundation from 1950 - 1955. This earlier program which was conducted by the Division of the Hospital Services, Minnesota Department of Health, indicated the need for more intensive study of paramedical services in Minnesota hospitals. During this period regional and other refresher training courses for medical and paramedical personnel were conducted under the sponsorship of the Minnesota State Medical Association, the Minnesota Hospital Association, the Minnesota Department of Health and the related professional groups.

Development of the anesthesia section of the project proceeded with the support and cooperation of the Anesthesia Advisory Committee which includes representatives of the Minnesota State Medical Association and its Anesthesia Committee, the Minnesota Society of Anesthesiologists, the Minnesota Association of Nurse Anesthetists, the Minnesota Hospital Association, and the Minnesota Department of Health. The Nurse anesthetist consultant, Mrs. Martha J. Lundgaard, Certified Registered Nurse Anesthetist, has undertaken the work of this portion of the study.

General Procedures

The findings presented in this report cover information on anesthesia departments of 182 licensed general hospitals in Minnesota during a one year period of study, 1956-1957. Collection of data was made over a 15 month period 1957-1958. The nurse anesthetist consultant made a personal visit to each hospital and obtained the desired information directly from the anesthesia personnel and/or the hospital administrator. At the time of her visit, the consultant filled out an extensive questionnaire consisting of 119 individual items which had been developed and revised to incorporate the suggestions of the Anesthesia Advisory Committee referred to above. The immediate objective of this survey was the development of a descriptive picture of the: (a) personnel, (b) equipment, (c) facilities, and (d) procedures in anesthesia departments. For certain questions upon which data were not immediately available from the hospital records, the information was subsequently obtained by mail. Most of the data were placed on IBM cards for machine processing.

Findings generally are presented to provide a summary picture for the State as a whole. Inasmuch as hospitals of different sizes often varied on certain points under study, analysis has been made in many cases to reveal these differences. The bed capacity categories used for analytical purposes and the number of hospitals in each are shown below.

Licensed Bed Capacity	Number of Hospitals
131 and over	30
71-130	21
31-70	49
21-30	41
0-20	41
	182

Complete information was obtained from almost all of the hospitals. The response rate in the reported items is not indicated when it equals or exceeds 95% of the hospitals. When it is below this percentage the actual number reporting is stated. All findings relate to anesthesia services in *surgery* unless otherwise indicated.

Limitations

Although it is felt that a useful and basically true picture concerning the questions studied has been obtained, certain factors which operate to limit the interpretation of the data should be recognized. This survey of anesthesia departments in Minnesota depended primarily upon the information provided by the anesthesia personnel in the hospitals. In some instances the nurse anesthetist consultant questioned the complete accuracy of certain responses since some of the personnel had less than RN training and were not always completely informed. Also, some of the nurse anesthetists knew what would be regarded as a "good" response and may have given it occasionally, rather than what may have been the existing situation. It was not always possible to wait for surgery schedules to be completed in order to visit the operating rooms to corroborate the information given.

Only anesthesia services of general hospitals of the State are reported. The report does not include the findings of special or Federal Hospitals, or visits to dental offices or privately owned clinics. It should be remembered that conditions studied are subject to change over a 2 or 3 year period and need to be reviewed periodically.

Definitions

Rural hospitals for the purpose of this survey are defined as hospitals located in towns or cities which have a population less than 10,000. There were 137 hospitals in this group. Forty-one hospitals were in the 0-20, 41 in the 21-30, 43 in the 31-70, 11 hospitals in the 70-130 and 1 in the 131 and over bed capacity categories.

Urban hospitals were those hospitals in municipalities with populations greater than 10,000. There were 45 hospitals in this group. Six were included in the 31-70, 10 in the 71-130 and 29 in the 131 and over bed capacity categories.

Findings

The resultant data of the nursing anesthesia survey are reported under main topics with analysis made according to bed capacity categories. These topics include Medical Anesthesia, Operating Room Nursing Personnel, Classification of Anesthesia Personnel, Anesthesia Personnel, Conditions of Employment, Equipment and Records, Anesthesia Procedures, and Administrative Management.

Medical Anesthesia

Medical Supervision of Anesthesia Personnel. Twenty-two hospitals (12%) reported that medical anesthesiologists[2] supervised the anesthesia personnel. In 3 additional hospi-

[2] The membership list of the Minnesota Society of Medical Anesthesiologists for November, 1956 included 54 active, 2 honorary and 31 junior members.

tals the anesthesia services were supervised by physicians with some anesthesia training. In hospitals without anesthesiologists the physician on each surgical or obstetrical case medically supervised the anesthesia services.

Physicians Administering Anesthetics. In 171 hospitals (94%), regular staff physicians administered spinal and local anesthetics. In 10 hospitals the spinal or local anesthetics were usually given by medical anesthesiologists. Thirty-one hospitals (17%) had medical anesthesiologists available to give anesthesia on request. Thirteen hospitals had 19 physicians with some anesthesia training who gave all types of anesthesia. The percentage of hospitals of the several bed size categories which have anesthesiologists and/or certified registered nurse anesthetists on the staff is shown in Figure 1.

Operating Room Nursing Personnel

Nursing Coverage in Surgery. Nursing personnel in the operating room are an integral part of the surgical team. Therefore, information was obtained concerning nursing cov-

Figure 1

Percentage of Hospitals in Minnesota with Medical Anesthesiologists and/or Certified Registered Nurse Anesthetists, 1956-1957

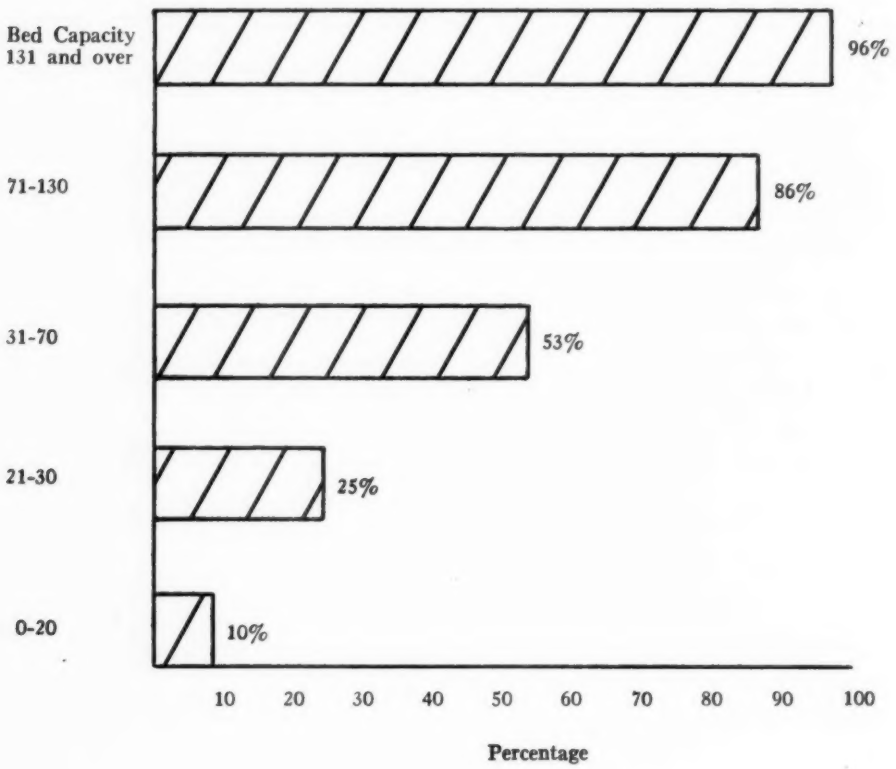


Table 1

Types and Number of Nursing Personnel in Surgery in Minnesota Hospitals, 1956-1957 (excluding anesthesia personnel)

Bed Cap.	No. Hosps.	Registered Nurses					Lic. Practical or Practical Nurses				Nurse Aides			
		None	Part-time	1-3	4-7	More than 7	None	1	2	3 or more	None	1	2 or 3	Other
131 or over	30	0	0	2	8	20	16	7	2	5	2	5	13	10
71-130	21	0	0	11	10	0	13	6	1	1	4	9	4	4
31-70	49	1	0	45	2	1	38	8	3	0	16	25	8	0
21-30	41	1	2	36	0	0	26	12	1	1	20	13	7	0
0-20	41	1	4	32	0	0	22	18	0	0	20	19	2	0
		3	6	126	20	21	115	51	7	7	62	71	34	14
Total	182	176					180				181			

erage in surgery. One hundred and seventy-three hospitals (95%), employed registered nurses in surgery. Six hospitals employed RNA's on a part-time basis with the RN administrator to circulate for the procedure and to supervise the surgical department. Three hospitals employed licensed practical nurses or practical nurses and nurses aides exclusively.

Sixty-five hospitals (36%) employed licensed practical nurses or practical nurses.[1] Several of the persons interviewed indicated they preferred to employ nurse's aides whom they had trained in operating room techniques rather than a licensed practical or practical nurse. The information on nursing personnel in surgery is noted in Table 1.

[1] Practical nurse refers to the individual who has had some nurse's training, including some who had graduated from a nurses' training school, but who was not registered or licensed in Minnesota.

Classification of Anesthesia Personnel

For ease of discussion, it is important to differentiate the various groups of persons who actually administer anesthesia in the hospitals of the State. The term anesthesia personnel as used here applies to any individual administering anesthesia, except those with a medical degree, who will be referred to as anesthesiologists or physicians. The total number of all such persons is discussed only in relation to the information in Table 2. Most of the discussion will center around segments of the total group which will be identified as follows:

CRNA—Certified Registered Nurse Anesthetist—a registered nurse who is certified as a nurse anesthetist by the American Association of Nurse Anesthetists, on basis of examination since 1945 or experience prior to 1945.

Nurse Anesthetist—a registered nurse who has been formally trained in anesthesia in an AANA approved school but who has not been certified in anesthesia.

Short-trained anesthetist — a registered nurse with anesthesia training in a school not approved by the AANA.

Job-trained—a registered nurse with only on-the-job training in anesthesia.

Other—personnel with less than registered nurses' training.

Anesthesia Personnel

Training of Anesthesia Personnel. Information regarding the number of anesthesia personnel with varying amounts of training (180 of 182 hospitals reporting) is presented in Table 2. (The figures reported do not include 31 anesthesiology residents nor 54 nurse anesthetist students in training.)

Eighty-eight hospitals (49%) employed 238 CRNA's. Over two-thirds (151) of the CRNA's were employed by the 30 hospitals with 131 beds and over. Fifty-three nurse anesthetists (non-CRNA's) were employed by 18 hospitals (10%).

Twenty-four hospitals (14%) employed 26 short-trained anesthesia personnel.

One hundred and five hospitals employed 199 job-trained anesthesia personnel.

Seventeen hospitals employed other personnel. Eleven hospitals employed 11 licensed practical or practical nurses who gave anesthesia in

Table 2

Training of 615 Persons Giving Anesthesia in Surgery in Minnesota Hospitals, 1956-1957 (based on replies from 97% of Hospitals)

Bed Capacity	No. Hosps.	MDA[1]	Phys.[2]	RN Formally-trained in Anesthesia		RN Limited Anesthesia Training		Other Personnel[4]
				CRNA[3]	Non-CRNA	Non-approved School	On-Job	
131 and over	30	52	1	151	45	7	9	0
71-130	21	2	2	36	3	2	16	0
31-70	49	1	4	33	3	7	58	3
21-30	41	1	2	14	1	7	68	11
0-20	41	0	10	4	1	3	48	10
Total	182	56	19	238	53	26	199	24

[1] MDA — Medical anesthesiologist
[2] Phys. — Physician who provides all types of anesthesia services to hospitals
[3] CRNA — Certified registered nurse anesthetist
[4] Other personnel — Individual with less than RN training, i.e., LPN, PN, Aide, etc.

surgery, 3 employed 9 nurse aides who gave anesthesia in surgery, and 3 hospitals employed 4 persons with still other types of limited training.

A lack of trained anesthesia staff was observed throughout the rural hospitals. The failure of the smaller hospitals to attract well-trained anesthesia personnel was probably due to: (1) a low case load, (2) the hospital's inability to pay prevailing salaries, and (3) few community activities of interest to prospective anesthetists.

It is of interest to note that there were nearly as many personnel (249) without qualified anesthesia training giving anesthesia in surgery as there were RN's with formal anesthesia training (291).

Qualifications of Chief Nurse Anesthetist. Of the 125 hospitals employing full-time anesthesia personnel, 65 had chief nurse anesthetists who were certified by examination, and 18 who were certified by experience. Ten hospitals employed chief nurse anesthetists who were RN's with formal anesthesia training but who were not certified. The remaining 32 included RN's, on-the-job anesthesia trained, and others who administered anesthesia under the supervision of a physician.

Association Membership of Chief Nurse Anesthetists. Of the 125 hospitals with full-time anesthesia personnel, 88 had chief nurse anesthetists on the staff who qualified for membership in the American and the Minnesota Associations of Nurse Anesthetists. Of those who had such eligibility, 83 maintained both memberships. Nine hospitals employed chief nurse anesthetists who were not qualified for the above but who were members of the American and the Minnesota Nurses Association.

Attendance of Chief Nurse Anesthetists at Professional Meetings. Fifty-five hospitals indicated they employed a chief nurse anesthetist who had attended an annual meeting of the American Association of Nurse Anesthetists. The chief nurse anesthetists from 65 hospitals attended some of the meetings of the Minnesota Association of Nurse Anesthetists. Five hospitals employed chief Anesthetists who attended meetings of the Minnesota Nurses Association, and chief anesthetists of 57 hospitals (31%) attended other professional meetings.

In a few rural hospitals which were at considerable distances from Minneapolis and St. Paul where the Minnesota nurse anesthetists' meetings were held, the nurse anesthetists found it more convenient to attend the district nurses' meetings.

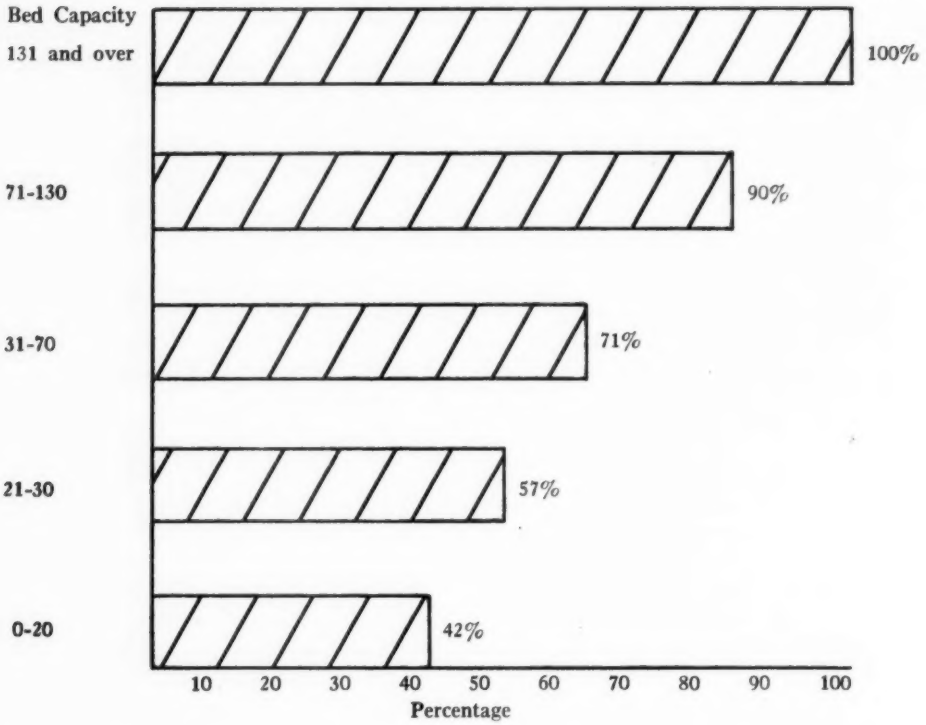
Anesthesia Staff Meetings. Of the 48 hospitals with two or more full-time anesthesia personnel, 17 had anesthesia staff meetings. Of the 17 hospitals, 7 had meetings once a month, 5 had meetings once a week and 5 had meetings at other time intervals.

Responsibility for staff meetings was shared by the anesthesiologist and the chief nurse anesthetist in most cases. Demands of the service and call schedules, coupled with shortage of personnel often made it inconvenient to arrange a regular time for anesthesia staff meetings.

All but one of the hospitals which conducted anesthesia staff meetings had 131 beds or more.

Figure 2

Percentage of Minnesota Hospitals Reporting One or More Full-time Anesthesia Personnel in Surgery, 1956-57



Number of Hospitals Reporting Full-time Anesthesia Personnel.

For the purposes of this study, full-time anesthesia personnel are defined as those persons who work full time and whose primary duties involve the administration of anesthesia. Free-lance anesthesia personnel and persons who are employed primarily for other functions, but who occasionally administer anesthesia are classified as part-time anesthesia personnel. Thus the term, full-time anesthesia personnel as used here suggests amount of time spent in anesthesia and does not signify any particular training background or level.

One hundred and twenty-five hospitals (69%) of the 182 reporting had at least one full-time person in anesthesia. In two-thirds of these hospitals only one full-time anesthesia person was employed; whereas, in each of 3 hospitals, 26 or more full-time anesthesia personnel were so employed in hospitals. A total of 447 persons were employed full-time in the hospitals of the State. Figure 2 shows how the percentages of hospitals employing full-time anesthesia

personnel increases as hospital size increases.

The total and average number of full - time and part - time anesthesia personnel employed in hospitals of the various bed sizes are shown in Table 3. A significant difference of 8.4 (average number) full-time anesthesia personnel is indicated between the 131 and over and 71-130 bed hospitals. This difference may be due to greater number of surgical procedures in the larger hospitals.

Number and Qualifications of Part-time Anesthesia Personnel. One hundred and twelve hospitals (62%) employed 168 part-time anesthesia personnel. Thirty-five hospitals with part-time anesthesia personnel employed CRNA's, 70 hospitals employed RN's with either formal or on-the-job anesthesia training, and 7 employed persons with less than RN training. Some of the smaller, rural hospitals where surgery was performed only 2 or 3 times a week found it to their advantage to share a formally trained nurse anesthetist. In some of the larger, urban hospitals part-time anesthesia personnel were employed in addition to regular staff to take week-end calls.

Conditions of Employment

The following findings relating to conditions of employment for anesthesia personnel are to be interpreted with some modification from other questionnaire items. This is primarily because the Catholic hospitals had special, though variable, arrangements to govern sisters employed as anesthetists and did not specify the benefits under study. Also, part-time anesthesia personnel in most hospitals were not granted fringe benefits or travel considerations. Thus, unless

Table 3

Full-time and Part-time Anesthesia Personnel in Minnesota Hospitals, 1956-1957

Bed Capacity	No. Hosps.	No. of Hosps. with Full-time Personnel	No. of Full-time Anesthesia Personnel	Average No. Full-time Personnel	No. Hosps. with Part-time Anes. Personnel	No. of Part-time Anesthesia Personnel	Average No. Part-time Personnel
131 and over	30	30	320	10.6	10	16	1.6
71-130	21	19	43	2.2	8	14	1.7
31-70	49	35	41	1.1	37	52	1.4
21-30	41	24	26	1.	28	40	1.4
0-20	41	17	17	1.	29	46	1.5
Total	182	125*	447	3.5	112*	168	1.5

* The total figure exceeds 182 since some of the hospitals employed part-time in addition to full-time anesthesia personnel.

otherwise stated, the following information on employment practices pertains only to full-time paid anesthesia personnel and excludes part-time people, Catholic Sisters, and those with medical degrees.

Scheduled Hours on Duty for Full-time Personnel. In nearly two-thirds of the hospitals (125) employing full-time anesthesia personnel the reported work day was between 7-8 hours. In most of the remaining hospitals the work day ranged between 4-6 hours. The average work day was 6.5 hours. These work hours resulted in work weeks ranging from 20-40 hours and an average of 29.2 hours of scheduled work. A work week in this report includes 5 working days. There was a greater tendency for anesthesia personnel to work a scheduled 7-8 hour day in the larger hospitals than in the smaller hospitals.

Number of First Call Days Per Week. In over one-half of the hospitals employing full-time anesthesia personnel, they were on call every day in addition to the scheduled hours on duty. In one-fifth of the hospitals the anesthetists were on call every other day, in the remainder of the hospitals they were on call either once or twice a week. The average number of first call days per week was 4.8.

Night, Weekend and Holiday Staff Call. Among the anesthesia personnel who took night, weekend and holiday call aside from physicians were CRNA's, RN Anesthetists, Administrators and Student Nurse Anesthetists. A number of hospitals found it necessary to employ outside anesthesia personnel for such call. One hundred and fifteen hospitals (67%) indicated that in addition to the regular staff, other anesthetists took call, 45 hospitals (26%) indicated the staff nurse anesthetists including chief nurse anesthetists rotated call. The remaining 12 hospitals (7%) indicated that the night anesthetist rotated call with regular anesthesia staff or that the regular staff excluding the chief nurse anesthetist rotated call.

Overtime. The overtime for full-time anesthesia personnel has been classified as frequent, infrequent, or occasional. *Infrequent* referred to sporadic overtime such as normally occurred not oftener than once every 4 weeks; *occasional* meant incidental overtime such as occurred approximately every two weeks; *frequent* referred to overtime which occurred at short intervals, possibly once a week or oftener. One hundred and forty-five hospitals (80%) provided information on overtime for the anesthesia personnel. More than 1/3 of those hospitals (39%) indicated that the anesthesia personnel had overtime duty infrequently. Sixteen large hospitals (11%) reported no overtime, since they employed sufficient number of anesthesia personnel. Forty (28%) reported occasional overtime; 22 hospitals (15%) reported frequent overtime and the remaining 11 hospitals (7%) reported other overtime arrangements.

Of the 129 hospitals reporting overtime considerations, 73 hospitals (57%) indicated that overtime duty was reimbursed with time off, 23 hospitals (18%) reimbursed overtime by paying on an hourly basis. The 33 remaining hospitals (25%) gave neither time off nor additional pay to anesthesia personnel for overtime.

In general "frequent" overtime was reported less often in those hospitals

Table 4

Vacation, Sick Leave and Holiday Policies in Minnesota Hospitals for Full-time Anesthesia Personnel, 1956 - 1957

Bed Capacity	No. Hosps.	Vacations			Sick Leave			Holidays		
		No. Hosps. Reporting	Ave. No. Wks.*	No. Hosps. without Vacation	No. Hosps. Reporting	Ave. No. Days	No. Hosps. without Sick Leave	No. Hosps. Reporting	Ave. No. Days	No. Hosps. without Holidays
131 and over	30	29	2.5	0	26	11.7	0	27	6.9	0
71-130	21	20	2.3	0	16	12.	0	17	6.5	2
31-70	49	36	1.8	2	29	11.7	2	31	6.7	7
21-30	41	22	2.1	7	15	10.6	8	14	6.2	14
0-20	41	16	1.8	5	9	11.3	7	9	6.4	11
Total	182	123	2.1	14	95	11.5	17	98	6.6	34

* Work week includes 5 work days.

which provided time off or pay for overtime work than in those hospitals which did not. It may be assumed that this was due to better organization and administration of anesthesia departments.

Annual Vacation, Sick Leave, and Holiday Allowances. Table 4 shows that hospitals did not differ much in their leave and holiday provisions. In a great majority of cases the yearly benefits authorized were

Table 5

Payment Arrangements for Anesthesia Personnel by Percentage in Minnesota Hospitals, 1956-1957

Bed Cap.	No. Hosps.	No. Hosps. Reporting	M.S.[1] %	M.S. Plus Call Pay Per Case %	M.S. Plus Call Pay Per Time %	M.S. Plus Call Pay Per Case and Time %	Fees Per Case %	Fees Per Time %	Fees Per Case and Time %	Part M.S. and Fees %	Other %
131 & over	30	29	72	7	14	0	0	0	0	0	7
71-130	21	21	59	5	9	5	0	0	5	0	18
31-70	49	44	50	7	5	5	5	2	2	0	23
21-30	41	32	50	6	6	0	9	0	6	3	19
0-20	41	31	32	13	7	3	19	3	3	7	13
Total	182	157	Av. 52	8	8	3	7	1	3	2	17

[1] M.S. — Monthly salary

a two-week vacation, 12 days of sick leave and six or seven holidays.

Payment Policies for Anesthesia Personnel. The percentage of hospitals employing selected payment arrangements for anesthesia services is shown in Table 5. Slightly over one-half of the hospitals paid only monthly salaries. An additional 19 per cent paid monthly salaries in combination with call pay per case, per time, or both. Other arrangements such as fees and financial considerations in religious institutions were used in the remainder of hospitals.

Minimum Monthly Salary. Information on the minimum salary paid to full-time anesthesia personnel was obtained from 108 of the hospitals (59%). The remaining hospitals did not state the minimum or maximum salaries paid. One-third of the hospitals which gave this information paid a starting monthly salary of less than $300, another third of the hospitals paid $300 - $400, and the remaining third paid over $400 as the minimum salary.

The average minimum salary for anesthesia personnel in various size hospitals is shown in Table 6.

Maximum Monthly Salary. Information on the maximum salary of anesthesia personnel was obtained in 108 hospitals (59%). Twenty-eight per cent of these hospitals paid less than $375, a little over a third (36%) paid $375-$475 and the remaining (36%) paid $476 and over as the maximum salary to anesthesia personnel.

Observing the data of Table 6, it can be seen that the CRNA's and the nurse anesthetists received substantially higher salaries, which along

Table 6

Mean Monthly Salaries of CRNA's and RN Anesthetists, and All Other Full-time Anesthesia Personnel in Minnesota Hospitals, 1956-1957

Bed Capacity	Mean Minimum Salary for CRNA and RN Anesthetist	Mean Maximum Salary for CRNA and RN Anesthetist	Mean Minimum Salaries for All Others	Mean Maximum Salaries for All Others
131 and over	391.03	485.33	272.50	*
71-130	390.29	482.59	*	400.00
31-70	393.42	475.37	242.57	371.31
21-30	377.20	471.25	226.00	347.72
0-20	350.00	441.66	202.42	309.00
Mean	388.50	479.58	221.76	346.91

* Either the personnel employed were anesthesiologists or part-time people or the hospitals did not provide the information.

Table 7

Anesthesia Records in Minnesota Hospitals, 1956-1957

Bed Capacity	No. Hosps.	Patients' Charts			Anesthesia Department Records				
		Anesthesia Form	Operative Form	Nurses' Notes	Surgical Record Book	Anesthesia Record Book	Admission Record Book	Other	None
131 and over	30	30	0	0	13	14	0	3	0
71-130	21	21	0	0	14	6	0	0	1
31-70	49	43	3	3	47	0	1	1	0
21-30	41	29	10	2	34	3	2	2	0
0-20	41	23	3	15	23	0	13	3	1
		146	16	20	131	23	16	9	2
Total	182	182			181				

with added benefits to patients, give rise to positive argument for training in anesthesia. The maximum salary figure included only the stated amount paid to anesthesia personnel and does not include extra pay given for call or overtime duty.

The two larger hospital groups paid approximately the same minimum and maximum salaries to CRNA's and nurse anesthetists.

Anesthetic Fee for Minor and Major Operations (Flat Rate). Forty hospitals (22%) gave information on the flat rate paid anesthetists for minor cases. The flat rate fee ranged from $5 to $10 with a mean of $8.

Forty-three hospitals (24%) gave information on the flat fee rate paid the anesthetist on major cases. The flat fee ranged from $10-$15 with the mean of $12.

Equipment and Records

Equipment for Anesthesia. Gas machines were used in 156 hospitals (87%). Nearly all of the hospitals without machines had fewer than 20 beds. Airways of several types and sizes were used in 175 hospitals (97%). All but two hospitals had suction machines available. Endotracheal equipment was available in four-fifths of the hospitals (144).

Anesthesia Records. Two separate anesthesia records were maintained in hospitals, one for patients' charts and another for the anesthesia departments.

a. Patients' Records. One hundred and forty-six hospitals (80%) indicated they recorded information on individual anesthesia graphic forms, 16 hospitals recorded information on the operative form, and 20 hospitals recorded on nurses' bedside notes.

b. Anesthesia Department Records. One hundred and thirty-one hospitals (72%) recorded anesthesia information in the surgical record book. A limited number of hospitals (23) maintained a perma-

nent anesthesia record book. Over one-half of the hospitals which had this more acceptable method of recording permanent anesthesia information, had 131 or more beds. Sixteen hospitals recorded information in the admission record book.

In contrast to the limited number of anesthesia record books used as shown in Table 7, there were 20 hospitals in which the anesthesia information was placed only on the nurses' notes. Fifteen of these 20 hospitals had fewer than 20 beds.

Individual Responsible for Compiling Monthly and Annual Anesthesia Reports. Over 1/3 of the hospitals (35%) reported that the bookkeeper or the medical record librarian compiled monthly and annual anesthesia reports. In about 1/4 of the hospitals (24%) the administrator compiled the reports, and in the remaining hospitals (41%), the chief nurse anesthetist, surgical supervisor, surgical secretary or medical anesthesiologist compiled the reports. As noted in Table 8 the responsibility for compilation was frequently shared by more than one individual.

Table 8

Responsibility for Monthly and Annual Anesthesia Reports in Minnesota Hospitals, 1956 - 1957

Bed Capacity	No. Hosps.	No One Designated	Anesthesiologists	Chief Nurse Anesthetist	Surgical Supervisor	Surgical Secretary	Bookkeeper or Medical Record Librarian	Admin.
131 and over	30	0	8	17	1	6	4	0
71-130	21	0	0	8	8	0	9	1
31-70	49	1	1	11	11	0	31	13
21-30	41	0	0	6	4	1	21	20
0-20	41	0	0	1	4	5	16	22
		1	9	43	28	12	81	56
Total	182**	230*						

* In several hospitals responsibility for reporting was shared by more than one individual.
** All hospitals reported.

Part II of this two-part article will appear in the August issue of this Journal.

Megimide in the Management of Barbiturate Intoxication: a case report

Margaret T. Tobin, C.R.N.A.*
Chicago, Illinois

Bemegride (Megimide, B-Ethyl-B-methyl-glutarimide), is a central stimulant possessing many of the properties of central analeptics. The predominant action of Megimide is to counteract central nervous system depression produced by barbiturates. The discovery of Megimide led to its trial use in the treatment of barbiturate intoxication, and the success of this method has been widely confirmed in many countries.

Although considerable research has been stimulated by the successful clinical use of Megimide (particularly in cases of barbiturate intoxication) there is evidence that the mode of action is superior to other analeptic drugs, since it produces its effect, as a central nervous system stimulant, at a dosage appreciably below that which results in convulsions.

Clinical reports have indicated that the management of coma due to accidental or suicidal overdosage with barbiturates may be facilitated by the use of Megimide. In the management of barbiturate coma it is not possible to indicate an appropriate dosage. Each case requires individual assessment, and it is important that the patient's progress be assessed by clinical observation rather than by estimation of blood barbiturate levels.

Megimide is supplied for intravenous administration in sterile 10 cc. ampules, each containing 50 mg. dissolved in 10 cc. of saline to form an isotonic solution. The dosage is variable or directly proportionate to the degree of depression. Administration of as little as 50 mg. may bring about the desired result in slight depression, while up to 1 Gm. may be required to reverse profound comatose states of depression. Overdosage may result in convulsions, and the administration of Megimide should not be commenced unless an ultra short acting barbiturate is readily available.

In barbiturate intoxication supportive therapy should be instituted immediately, such therapy to include establishing an intravenous infusion, and the maintenance of a patent airway. Megimide is administered intravenously either by slow intravenous drip method or by intermittent doses of 50 mg. every 3 to 5 minutes until the return of muscle tone, pharyngeal, and laryngeal reflexes.

* Anesthesia Department, Ravenswood Hospital School of Anesthesia, Chicago.

Subsequent to the restoration of reflexes, regression is a possibility. Accordingly, continuous clinical evaluation is essential, as such regression is treated by administering a further series of injections of Megimide.

Although reports are conflicting as to whether Megimide reduces the period of unconsciousness, it is generally agreed that the patient is quickly returned to a "safe state," namely a restoration of protective reflexes, along with adequate improvement of the vital functions.

Recently, at Ravenswood Hospital, Chicago, we have experienced a rather dramatic and stimulating situation relative to profound barbiturate poisoning with the use of Megimide as a most satisfying antagonist. The following case report is submitted from the viewpoint of current interest in the use of a comparatively new drug.

A 46 year old white married woman was admitted on February 5th at 12:55 p.m. to the Emergency Room via police ambulance receiving Police Department Personnel resuscitative measures. Her general condition on admission was: Color pallid; respirations absent; peripheral pulsation not palpable; absence of all reflexes; deeply comatosed. A cursory examination by the Emergency Room resident revealed a faint apical heart beat. An oropharyngeal airway was inserted and oxygen by positive pressure mask was immediately employed, simultaneously with intracardiac administration of Coramine 2 cc. No immediate history could be obtained.

The apical heart beat became more audible via stethoscope, but no generalized improvement or respiratory effort was noted. At 1:06 p.m. there appeared to be a cardiac arrest. A thoracotomy was performed at 1:10 p.m. The heart was at a standstill and cardiac massage was immediately instituted. An endotracheal tube was inserted atraumatically with ease at 1:15 p.m. and respirations were controlled manually via an anesthetic machine at the rate of 20/minute. At this time the heart resumed normal action, no fibrillation occurred, the volume was strong and the rhythm regular, and the patient's color markedly improved. Peripheral pulsations were perceptible and of good quality. At 1:24 p.m. the blood pressure was obtained at 110/70, pulse rate 114 and of fairly good quality, but apnea persisted. Venipuncture with an 18 gauge needle was performed, and an infusion of 1/6 Molar Lactate was started. Blood was drawn for a complete blood count and a blood chemistry. A catheterized specimen was obtained for a complete urinalysis. An electrocardiogram was procured.

Irregular and depressed spontaneous respiratory efforts were noted at 1:30 p.m. Attempt to aspirate the stomach contents was unsuccessful due to the inability to insert the Levine tube beyond 2 cm. after entrance into the esophagus. At this time it appeared that the patient apparently regurgitated a moderate amount of thin, paste-like, pink-tinged material prior to insertion of the endotracheal tube, as a considerable amount of this material was aspirated from the tracheal tree via the cuffed endotracheal tube, as well as from the oral and nasal pharynx. Information supplied by the patient's husband revealed previous psychiatric hospitalization, and the strong possibility of her having ingested 36 to 39 grains of Seconal. An empty bottle that had contained approximately that amount was found near the patient.

While the superficial layers of the chest wall were being closed respirations were manually controlled, and occasional spontaneous respiratory effort assisted. At 2:00 p.m. Picrotoxin 3 mg. was administered intravenously with no objective response. The patient was then removed to the surgical suite for surgical closure of the thoracotomy. After transferral to the operating room the blood pressure suddenly dropped to 70/40 - 60/30. One unit of plasma was started immediately. The hypotension responded satisfactorily to vasopressors—Neosynephrine 10 mg. added to 200 cc. 1/6 Molar Lactate by the drip infusion method.

At 2:25 p.m., after definite determination of profound central nervous system depression due to a massive overdosage of Seconal had been established, the following intravenous Megimide regime of therapy was instituted: 2:30 p.m. — 50 mg., 2:35 p.m. — 50 mg., 2:40 p.m. — 50 mg., 2:43 p.m. — 50 mg., a total of 200 mg. on an intermittent basis. Almost immediately following the completion of this series of injections there was obvious apparent spontaneous respiratory effort of short duration. All reflexes remained obtunded. The response to supportive treatment throughout the surgical procedure, which included a gastrostomy which was resorted to as a means of stomach lavage, was satisfactory. The patient received 100% oxygen via endotracheal tube; semi-closed technique; circle absorber; manually controlled respirations. The blood pressure was maintained between 130/90 and 114/80 with Neosynephrine drip infusion; pulse rate between 76 and 80. Color was good.

At 4:15 p.m. the patient was transferred directly to the bed from the operating table and taken to the Intensive Therapy Unit. The endotracheal tube remained in place, and oxygen was administered with a portable unit while in transit. Upon arrival on the ward the endotracheal tube was connected to the Bennett Respirator, and 60% oxygen was administered at 5 centimeters water pressure at the rate of 20 per minute. The under-water-chest-suction was firmly established, and functioning satisfactorily. Sufficient chest expansion was noted, and her color was fairly pink. Blood pressure 130/90; pulse rate 76, and of good quality.

One unit of whole blood was started, by slow drip, to replace blood loss during surgical procedure. The report from the blood chemistry revealed a a blood sugar of 380 mg. percent, and a carbon dioxide combining power of 32 percent. Twenty-five units of regular Insulin added to 1000 cc. 5% Dextrose in Water was started intravenously, but discontinued after 200 cc. (5 units of Insulin) had been given, as blood drawn just prior to instituting therapeutic Insulin regime was reported to be 186 mg. percent. Urinalysis (via Foley retention catheter) 1 plus sugar, and acetone free.

At 4:40 p.m. an additional 200 mg. Megimide in 500 cc. normal saline at the rate of 30 drops per minute were given. On February 6th at 1:00 a.m. and at 9 a.m. an additional 200 mg. Megimide in 250 cc. 1/6 Molar Lactate were repeated by the drip technique. A total of 800 mg. Megimide was administered over a period of 18 hours to a patient weighing approximately 50 Kg. During this interim the patient remained deeply comatosed, however, vital signs were stable.

The reactive progress of the patient is as follows:

On February 6th:

1:30 a.m.	Sluggish pupillary reaction to light.
4:30 a.m.	Spontaneous regular respirations.
7:00 a.m.	Cough reflex present during suctioning of endotracheal tube.
10:00 a.m.	Pharyngeal reflex present.
10:00 p.m.	Laryngeal reflex present (did not reject endotracheal tube).
11:00 p.m.	Facial muscle movement noted during nasal suction. Bowel sounds audible.

On February 7th:

5:30 a.m.	Opened her eyes. Moved all four extremities voluntarily.
3:00 p.m.	Respirations regular and full. Color good. Blood pressure and pulse stabilized. Endotracheal tube removed. Bennett Assister discontinued.
5:30 p.m.	Patient seemed to recognize her family.

February 8th:

Conversed fairly rationally. Ate well, recognized, and remembered the different foodstuff she had eaten during the day. Blood chemistry, and urinalysis within normal limits. The urinary output since admission was adequate. On this day a laboratory report revealed the urine to contain 35 mg./cc. of barbiturates.

During the period of the patient's hospital convalescence, until discharge on February 28th, she had periods of

being lucid, and periods of being moderately confused. She walked the corridors; read magazines; visited with her family and hospital personnel, and appeared physically well.

Psychiatric evaluation on February 18th disclosed that this patient was disoriented as to time, place, and present situation. Her memory was impaired to immediate, recent, and distant past events. Her reasoning and judgment were impaired, and her general fund of knowledge was less than prior to admission February 5th. The impression at this time was: Organic brain syndrome due to cerebral anoxia, and the prognosis was guarded.

The earliest report of the clinical use of Megimide appeared in 1954, and experience has shown that it has considerable value in the treatment of barbiturate coma, although the exact mode of action remains uncertain.

Adding to the reports is this case report of barbiturate poisoning, with respiratory failure and cardiac arrest as a result of massive overdosage, was treated with cardiac massage; endotracheal intubation to insure adequate oxygenation; manual and Bennett Respirator controlled and assisted respirations during depression; gastrostomy lavage; Megimide 800 mg., as supportive treatment.

Insurance

I'll Think It Over!!

Way back in September of 1955, I recall a member who answered a request to enroll in the "Income Protection Plan" with a simple "I'll think it over".

Winters, Summers, Springs and Falls have come and gone. As a matter of fact, it is exactly five Winters, five Summers, five Springs and five Falls which have come and gone and still the member said "I'll think it over".

During this time many, many hundreds of claims have been paid to members in time of need. Many, many thousands of dollars have helped during an illness or accident. And many, many hundreds of members have joined the approved Group Income Protection Plan. But, to quote the member: "I'll think it over".

During this time, no policy has ever been cancelled, no rider has ever been added to a policy and no increase in premium. Rather, benefits have been increased. Such excellent benefits as "Lifetime Accident Benefit" without any additional request for premium. Maximum monthly benefits have doubled and yet—"I'll think it over".

Wish I could come up with the "horrible example" selling point and tell you that "I'll think it over" recently fell out of the operating room window and probably will be crippled for life. Wish I could point out what the loss of her income will mean over the coming years. The humility of accepting charity; the lack of proper medical attention; the seemingly everlasting need for pity; wish I could point out this "horrible example" but I can't. This member is in excellent health, received a nice promotion and was recently elected President of the Procrastination Club. Congratulations!

Right now we are in the middle of our "Annual Spring Enrollment". This is one of the "now or never" opportunities. This year you may enroll without any fear of not being accepted. Next year may be too late. Think it over.

Every member has received in the mail an invitation to participate in the AANA Approved "Income Protection Plan". If, perchance, this invitation was not received, complete the coupon on page 180.

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Hospital Safety

Harriet L. Aberg, C.R.N.A.

Recent questions concerning textiles for use in areas where flammable anesthetics are to be used have included queries about slips, cotton mixtures and permanent finishes; stockings; uniforms, cotton-dacron mixtures, permanent finishes, and Progar poplin; Velcro fasteners.

The questions about slips and uniforms can be combined. A cotton-dacron mixture has been tested and found safe, others were not safe. It seems that to some degree, it depends on the manner of weaving the threads. For instance, if the warp threads are of cotton and the threads of the woof are of synthetic, there is a good possibility that the material will act much like plain cotton. But if the synthetic is bonded to the cotton and this thread is woven to make the fabric, the material will probably act like the synthetics and will be easily electrified with static. As for permanent finishes, most of them destroy the hygroscopic quality of cotton so that it will act like a synthetic and so be unsafe.

However, it should be remembered that it is incumbent on the manufacturer of the textile and perhaps the dealer or agent to offer proof positive that any textile in question is safe when used for the purpose intended. If a uniform or slip or the material to make them are sold as being safe for use in areas where flammable anesthetics are to be used, then upon being asked, the manufacturer should be able to prove that the textile in question has a measured surface resistivity value of less than 5×10^{11} ohms (per unit square of the material) as measured at an ambient relative humidity of 40% by method 76-54 of the American Association of Textile Chemists and Colorists. Complying with Public Law 88, the Federal Flammable Fabrics Act, is not enough. The purchaser and wearer should not have the burden of proof, this must be the obligation of the manufacturer or seller.

If no such proof of safety can be offered, it would seem that wearing all cotton—untreated—slips and uniforms would be the safest and certainly the simplest answer. Untreated cotton has already been through the A.A.T.C.C. test and found to be safe. Slips of cotton plisse with no, or very narrow, hem trim are sold by mail order firms, department stores and specialty shops.

The usual women's nylon stocking is thin enough to be safe after a short period of wear. The entire stocking

is in 100% contact with skin. The normal moisture on the sole of the foot soon penetrates so there is good contact with the conductive inner sole or copper rivets in the shoe. This is easily determined in the daily testing of conductive footwear.

Velcro fasteners have been tested privately and seem to offer no electrostatic hazard. During testing, it was found that electrostatic charges leaked off rapidly from both the velvety and hooked parts, particularly narrow strips, in contrast for instance to nylon material which holds charges and is therefore a hazard. But it is incumbent on the manufacturer or dealer or retailer to offer positive proof that his product is safe for the purpose for which it is sold, proof of safety is not the obligation of the buyer or user.

Miss Aberg is A.A.N.A.'s representative on the N.F.P.A. Committee on Hospital Operating Rooms.

Any questions pertaining to hospital safety may be directed to the Executive Office. Answers will be included in this section in future issues.

Legislation

Emanuel Hayt, LLB., Counsel A.A.N.A.

Dentists in Florida Limited in Administration of Anesthesia

Florida's Attorney General in December, 1958 and in January, 1959 ruled that a dentist "may not hold himself out as an independent practitioner in a new healing art; vix, medical anesthesia, because he is capable and licensed as a dentist to administer anesthesia only for dental purposes does not legally qualify him for administering general anesthesia." He also ruled that if "a dentist wishes to serve as an employee of a physician to administer anesthesia, similar to that given by a physician's nurse under his supervision and direction, he may do so; provided each physician is willing to accept the legal responsibility for his acts."

Subsequently, a Florida dentist, employed by Mount Sinai Hospital to administer anesthesia to medical patients as an employee of the hospital, filed a friendly declaratory suit in the Circuit Court of Dade County in an attempt to establish his legal status. On May 27, 1959, the Circuit Court dismissed his suit.

Dr. Frederick K. Tesher v. State Board of Medical Examiners, #59C 3115, Circuit Court, Dade County, Miami, Fla.; Attorney General of the State of Florida, Opinion No. 058-336 rendered to Dr. Homer L. Pearson on December 16, 1958 and Opinion No. 059-6, supplement to 058-336 rendered to the Honorable Edward S. Resnick on January 15, 1959.

Back Issues

Other than the first three volumes, back issues of the Journal of the American Association of Nurse Anesthetists are available.

The cost from 1935 through 1959 is $1.50 for each year (4 issues). A few issues are in short supply, but do become available to us from time to time.

Orders may be sent to the American Association of Nurse Anesthetists, Suite 3010, 130 E. Randolph St., Chicago 1, Ill.

Abstracts

Mendelsohn, David, Jr., MacKrell, T. N., MacDonald, D. W., Nogueira, Cid, Head, L. R., Jr. and Kay, E. B.: Management of the patient during open heart surgery. Surgery 45: 949-965 (June) 1959.

"This report presents our experiences with the first 200 open heart operations, with special emphasis on the newer aspects of the management of anesthesia. . . . The Kay-Cross pump-oxygenator . . . was used in all cases in this series. . . . The management of the patient during open heart surgery, with the use of a pump-oxygenator, requires a high degree of teamwork, understanding, and liaison between various members of the cardiac surgery team. . . . The anesthetic has been primarily endotracheal cyclopropane in a closed circle filter employing controlled hyperventilation. . . . During bypass, anesthesia is maintained by the continuous addition of cyclopropane, along with carbon dioxide and oxygen to the oxygenator. . . .

"The patients' ages ranged from 1 month to 54 years. . . . There is an over-all mortality rate of 28 per cent ranging from no mortality in non-complicated congenital defects to 100 percent in the more complicated defects such as transposition of the great vessels. Thus, the mortality rate is primarily influenced by the type of lesion to be corrected. . . .

"A number of monitoring devices . . . have supplemented but have not replaced the clinical evaluation of the patient. Ventricular fibrillation is a common complication following elective cardiac arrest, especially in acquired diseases of the heart. A marked drop in oxygen tension in the oxygenator occurs during electric defibrillation. Succinylcholine chloride in paralyzing doses prevents this. Isuprel is an effective chemical defibrillating agent when 'slow' ventricular fibrillation occurs. The metabolic acidosis which occurs early during the bypass spontaneously corrects itself in the post-bypass period provided circulation is adequate. Direct coronary perfusion is a valuable adjunct in the management of open aortic valvular surgery."

Berger, F. M., Kletzkin, M., Ludwig, B. J., Margolin, S. and Powell, L. S.: Unusual muscle relaxant and analgesic properties of N-isopropyl-2-methyl-2-propyl - 1,3 - propanediol dicarbamate (carisoprodol). J. Pharmacol. & Exper. Therap. 127: 66-74, Sept. 1959.

"The replacement of a hydrogen on one of the carbamyl nitrogens of meprobamate with an isopropyl group yielded N-isopropyl-2-methyl-2-propyl-1, 3-propanediol dicarbamate, called carisoprodol. This compound possesses a qualitatively different kind of central muscle relaxant action than the parent compound, and in addition differs from it in having analgesic action in certain types of

pain and in having an atropine-like effect on the central nervous system. . . .

"Carisoprodol . . . is particularly effective in releasing decerebrate rigidity but is only a weak strychnine antagonist. It produces high voltage, low frequency brain wave patterns and blocks electroencephalographic activation. At the same time, like atropine, it is without effect on consciousness or behavioral arousal. Carisoprodol relieves pain produced by injection of joints with silver nitrate but is not very potent in other pharmacological tests for analgesia. Carisoprodol also differs from meprobamate in not affecting hippocampal seizures."

Christensen, R. O.: A new agent for shortening recovery time in oral surgery. Oral Surg., Oral Med. & Oral Path. 11: 999-1003, Sept. 1958.

"Hastening the recovery of patients from anesthesia is extremely important to the oral surgeon and his staff from the standpoints of economy and of easing or reducing their work load. . . . Recently we were introduced to parenteral Ritalin . . . With Ritalin, recovery was earlier and better, and there was no relapse of drowsiness. There was also a much more rapid return of muscular coordination and a lessening of the euphoria so common following the use of intravenous barbiturate anesthesia. In general, patients were up and out of our office within twenty-five to thirty minutes. Except for insomnia in a few cases where higher doses (40 to 50 mg.) were given late in the day, we encountered no side effects. . . . We did note one or two patients who did not seem to respond to the drug."

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Book Reviews

Medical-Surgical Nursing. By Kathleen Newton Shafer, R.N., M.A., presently with the Plainfield Visiting Nurse Association, Plainfield, N. J.; Janet R. Sawyer, R.N., A.M., Instructor, School of Education, Department of Nurse Education, New York University; Audrey M. McCluskey, R.N., M.A., Assistant Professor in Nursing, the Cornell University - New York Hospital School of Nursing, and Edna E. Lifgren, R.N., M.A., Assistant Professor in Nursing, the Cornell University - New York Hospital School of Nursing. The C. V. Mosby Co., St. Louis. Cloth. 989 pages, 130 illustrations. 1958. $8.75.

This text gives a general background in the nursing of patients who require medical and surgical treatment. The cause, prevention, medical care, principles of nursing care, and the significance of the disease to the patient, his family, the community, and the nation are considered. Attention has been given to some common questions which the nurse may be asked, and to teaching the patient and his family, both in the home and in the hospital.

The book is divided into two sections. The first deals with general considerations—trends and problems influencing patient care. The second considers nursing related to specific medical and surgical care. Study questions at the beginning of each chapter have been prepared for review. The references that are particularly helpful to students are indicated.

This excellent text will be of interest to anesthetists, especially those concerned with the teaching of students. Indexed and illustrated.

Anesthesia for Infants and Children. By Robert M. Smith, M.D., Anesthesiologist, The Children's Medical Center, Boston, Mass.; Assistant Clinical Professor of Anesthesia, Harvard Medical School; Consultant in Anesthesia, U. S. Naval Hospital, Chelsea, Mass. and Lemuel Shattuck Hospital, Jamaica Plain, Mass. The C. V. Mosby Co., St. Louis. Cloth. 418 pages, 182 illustrations. 1959. $12.00.

The author has written this book to summarize and record the anesthetic methods which have been found to be most practical and useful. Emphasis has been placed upon information which anesthetists usually lack when called upon to care for infants and children. In many instances this concerns pathology, pediatrics, or surgery rather than anesthesia.

An extensive list of references pertaining to the material follows each chapter. Many excellent illustrations are included. This text will be of great value to anesthetists, especially those concerned with pediatric anesthesia. Indexed.

Diseases of the Nose, Throat and Ear. By I. Simson Hall, M.B., Ch.B., F.R.C.P.E., F.R.C.S.E., Surgeon to the Royal Infirmary, Edinburgh. Williams & Wilkins Co., Baltimore. Cloth. 467 pages, 7th ed. 1959. $5.00.

The seventh edition of this text presents a discussion of the common complaints of the nose, throat, and ear. A short anatomical discussion precedes each section. Written primarily for the busy practitioner and student, anesthetists will also find the subject interesting. Indexed and illustrated.

Classified Advertisements

NURSE ANESTHETIST: 364 bed General Hospital being enlarged to 500 beds. Want to enlarge present staff of one M.D. plus 7 Anesthetists. Salary from $400 to $500 per month, plus extra bonus payment per case on call duty and retirement and sickness benefits. New air conditioned Operating Rooms. Apply Chief, Department of Anesthesia, York Hospital, York, Pa.

NURSE ANESTHETISTS—500 bed General Community Hospital. New and remodeled modern Surgical Suite, no OB, $500 - $550 per month to start, liberal benefits, College Town, excellent location. Write or call Administrator, Spartanburg General Hospital, Spartanburg, S. C.

ANESTHETIST for 100 bed fully accredited Pediatric Hospital located in a new progressing Children's Medical Center. Salary commensurate with training and experience. Excellent Personnel Policies and pleasant working conditions. Address inquiries to Dr. Dean C. Watland, Director of Department of Anesthesiology, Children's Memorial Hospital, 44th and Dewey Ave., Omaha, Nebraska.

NURSE ANESTHETISTS for 700 bed General Hospital. Pleasant working conditions. Salary open. Complete maintenance. Liberal employee benefits. Apply to: Personnel Director, Grady Memorial Hospital, Atlanta 3, Georgia.

POSITION OPEN for A.A.N.A. member to maintain present staff of four. Large University Hospital, excellent staff, with wide variety of surgical cases, including Thoracic and Cardiac Surgery. Two weeks paid vacation, twelve days sick leave, six paid holidays and insurance benefits if desired. Salary dependent upon experience, plus compensation for call time. Contact Miss Ramona Kersey, Chief Nurse Anesthetist, Firmin Desloge Hospital, St. Louis, Mo.

NURSE ANESTHETIST — Immediate opening for qualified Registered Nurse in 444 bed short term General Hospital with active Surgical Program. Opportunity to associate with three Board Certified Anesthesiologists. Salary commensurate with experience and training. Extra work available if interested. Write furnishing outline of experience to Director of Anesthesia, Delaware Hospital, 501 W. 14th St., Wilmington 99, Delaware.

NURSE ANESTHETIST: 240 bed hospital 60 miles East of Pittsburgh. Start $5460 - $6000 based on experience. Anesthesiologist in charge. Excellent policies including a retirement program & life insurance benefits. Contact: Personnel Director, Mercy Hospital, Johnstown, Pa.

ANESTHETIST—A.A.N.A. member, for 325 bed hospital 16 miles West of Chicago's Loop. Excellent salary. 4 weeks vacation, paid life insurance, Blue Cross available, sick leave, paid holidays and other liberal benefits. Alternate call duty with five other Anesthetists. Emergency OB call only, with fee for OB call. Apply Personnel Director, Memorial Hospital, Elmhurst, Illinois.

NURSE ANESTHETISTS for 220 bed community hospital. Working with private group. Two full time M.D.'s, four nurses, all agents and techniques. Modernization program going on. Two and one-half hours from Boston and New York. Write G. J. Carroll, M.D., William W. Backus Hospital, Norwich, Connecticut.

NURSE ANESTHETIST: for part time. Very few night calls, small OB Service; all types of inhalation anesthesia. 50 bed hospital, Valley of Virginia. Apartment available. Attractive for semi-retired CRNA. Apply Berdena M. Morey, C.R.N.A., Shenandoah County Memorial Hospital, Woodstock, Virginia.

NURSE ANESTHETIST for 275 bed hospital. Operating Room and Obstetrical Anesthesia. Excellent working conditions and personnel policies. Diversified and congenial surgical staff. Good salary — compensation for overtime and call duty. Apply: Dr. Van Kirk, St. John's General Hospital, 3339 McClure Avenue, Pittsburgh 12, Pennsylvania.

WANTED: Nurse Anesthetist for 150 bed hospital. Starting salary $6300 plus complete maintenance. 2 Nurse Anesthetists in department. College Town. Excellent Personnel Policies. Apply: J. W. Kenney, Administrator, Mary Lanning Memorial Hospital, Hastings, Nebraska.

NURSE ANESTHETIST — 225 bed General Hospital, suburban Detroit area. Salary $480.00 per month, with increases to $524.00. Blue Cross - Blue Shield, Social Security, retirement plan, group insurance available. Reasonable living accommodations available. Apply:
Administrator
Wyandotte General Hospital
Wyandotte, Michigan

NURSE ANESTHETISTS—for City Hospital, a 1000 bed General Hospital under the City of St. Louis. Salary range is $464 to $564 per month. Three weeks vacation. Eleven paid holidays. Sick leave benefits. Write to Department of Personnel, City of St. Louis, 235 Municipal Courts Bldg., St. Louis 3, Missouri.

WANTED: Nurse Anesthetist in a 110 bed General Hospital in beautiful Vermont town of 10,000 close to excellent ski areas. No Neuro or Heart Surgery. Approximately 1200 Surgical and 500 Obstetrical Anesthetics yearly. Department headed by Board Certified Anesthesiologist. One Nurse Anesthetist now; second needed. Excellent working conditions. Salary open. Contact F. L. Herrick, M.D., Director of Anesthesiology, Henry W. Putnam Memorial Hospital, Bennington, Vt.

OPENING available Oct. 1960 (for Nurse Anesthetist) for 30 bed hospital in small Northeastern Oregon community. Low surgical volume and no OB allows time for personal activities or other hospital duties with additional pay. This is an ideal situation for a married woman or an older person wanting to slow down or avoid heavy work schedules. 3 weeks vacation. Salary open. Apply Administrator, WALLOWA MEMORIAL HOSPITAL, Enterprise, Oregon.

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2 NURSE ANESTHETISTS. 275 bed hospital. Start $500.00 per month and maintenance. Emergency call every 5th day. Department directed by Anesthesiologists. Apply St. Frances Hospital, Monroe, La.

NURSE ANESTHETIST — 154 bed hospital—suburban community North of Chicago on Lake Michigan's beautiful shoreline. New surgery and other facilities recently constructed. Department of four Nurse Anesthetists under an M.D. Anesthetist. Salary open depending upon qualifications. Merit increases. Excellent living facilities. For further details write Personnel Director, Highland Park Hospital Foundation, Highland Park, Illinois.

NURSE ANESTHETISTS (4) — To increase present staff. Accredited 500 bed hospital in University town. Excellent salary; liberal Personnel Policies. Write Administrator, St. Joseph Mercy Hospital, Ann Arbor, Michigan.

OPENING for 2 Registered Nurse Anesthetists. University City, population 100,000. New 175 bed hospital, 2 M.D. Anesthesiologists and 4 R.N.A.s' now in department. Busy OB and Surgery. Day off after call. Must be energetic and willing to adopt new methods. Sick leave. 2 weeks vacation to start. Retirement plan and other benefits. Congenial working conditions. Begin $500 per month. Contact either Dr. Francis or Miss Chasteen, R.N.A., Central Baptist Hospital, Lexington, Kentucky.

NURSE ANESTHETIST—$500. New and Modern Surgery: unusually strong and well diversified Surgical Staff. Good opportunity in new 260-bed expanding hospital; college town location; good personnel policies; 40-hour week; 7 holidays, hospitalization. Social Security. Apply: F. J. O'Brien, Administrator, Chambersburg Hospital, Chambersburg, Pa.

NURSE ANESTHETIST: Wanted for 57 bed hospital. Two anesthetists employed. Salary open. Details on request. Contact: Administrator, Sid Peterson Memorial Hospital, Kerrville, Texas.

ANESTHETIST WANTED — 118 bed General Hospital. Approximately 2,100 operations and 700 deliveries annually. All surgery done by Board Certified Specialists. Anesthetist will be one of three providing Anesthesia to all Surgical and Obstetrical patients; starting salary $6,500 plus call in fees, depending on qualifications. Four weeks vacation, sick leave, retirement plan. Warsaw is a village of 4,000 population situated in the picturesque Wyoming Valley. One hour's drive to either downtown Buffalo or Rochester. Applicants will be reimbursed for travel pay to Warsaw for an interview at the rate of 8c per mile up to a maximum of 1,000 miles total round trip distance. Write Administrator, Wyoming County Community Hospital, Warsaw, N. Y.

NURSE ANESTHETIST — 500 bed hospital. Anesthesia Department consists of three M.D. and thirteen Nurse Anesthetists. Write to Medical Director, Crawford W. Long Hospital, Atlanta, Georgia.

REGISTERED NURSE ANESTHETIST: for shore resort community. New Operating Suite. 310 beds. Four weeks vacation with pay. Salary: $450.00 to $550.00. Bonus for each call case. Anesthesiologist on call at all times. No Obstetrical. Write Lawrence and Memorial Hospitals, New London, Connecticut.

NURSE ANESTHETIST — Night Surgery call only. 5 nights per week—no OB — liberal vacation — 2 pension plans and Social Security — Hospitalization free. Location Northeast Florida. Apply Box B-46, Journal American Association of Nurse Anesthetists, Prudential Plaza, Suite 3010, Chicago 1, Ill.

NURSE ANESTHETISTS: (two) to complete a staff of five for a 211 bed modern General Hospital located in Michigan's year 'round resort area. Approximately 350 cases per month with a minimum of OB's. Starting salary $550.00 per month, with regular increments plus attractive call compensation. Contact the Assistant Administrator, St. Luke's Hospital, 705 Cooper St., Saginaw, Mich.

REGISTERED NURSE ANESTHETIST: For 61 bed General Hospital. Staff of two Nurse Anesthetists maintained to compensate for call hours and weekends. Liberal Personnel Policies. Full maintenance provided in adjoining residence. Apply stating salary expected to: Margaret Vopni, R.N., Administratrix, Grafton Deaconess Hospital, Grafton, N. D.

NURSE ANESTHETIST: To complete staff of three for modern 100 bed hospital. Winter ski and summer boating area in beautiful Southern Vermont. Salary open — commensurate with qualifications. 4 weeks vacation, sick time, Blue Cross, etc. Apply Ronald H. Neal, M.D., Chief, Dept. of Anesthesiology, Springfield Hospital, Springfield, Vermont.

ANESTHETIST: 100 bed General Hospital needs second Anesthetist. Alternate call. Six paid holidays, paid vacation, hospitalization insurance, and many other benefits. Beginning salary $500 plus full maintenance. Opportunity for advancement. Hospital is located in community of 20,000 people and is 85 miles South of Memphis. Contact Administrator, Helena Hospital, Helena, Ark.

VETERANS ADMINISTRATION HOSPITAL, Ann Arbor, Michigan, has vacancy in Anesthesia Section. Anesthesia and Surgery Department of this 462 bed GM & S Hospital affiliated and integrated with respective department at University of Michigan Medical Center. Apply Personnel Officer.

WANTED: Nurse Anesthetist. Salary open. Apply Charles H. Gillespie, M.D., Scott and White Memorial Hospital, Temple, Texas.

ANESTHETISTS: Charleroi-Monessen Hospital (General, 199 beds and 36 bassinets), North Charleroi, Pa. (HU 3-5561). Salary $475-$550 with increments, sick leave, holidays, four calendar weeks paid vacation annually, Social Security, etc. Call or write Administrator.

WANTED—Nurse Anesthetist. Prefer one who will also be willing to do some floor duty. Write: Childress Clinic & Hospital, Goldthwaite, Texas.

NURSE ANESTHETISTS: All type of Anesthesia and Surgery. University Hospital, no night call, no Obstetrics, no weekends. Apply D. C. Weaver, M.D., Grace-New Haven Community Hospital, P. O. Box 1001, New Haven 4, Conn.

NURSE ANESTHETIST: New 142 bed, air-conditioned, approved General Hospital, College Town — 30,000 near Nashville. Pleasant work situation, employee benefits. Guaranteed minimum plus fees for call back. Administrator, Memorial Hospital, Clarksville, Tenn.

REGISTERED NURSE ANESTHETISTS: 690 bed hospital, primarily Surgical, active Operating Suite. Integral part of developing 236 acre Detroit Medical Center. Salary commensurate with qualifications. Liberal Personnel Policies. Write or call Personnel Director, Harper Hospital, Detroit 1, Mich.

WANTED: Registered Nurse Anesthetist. Part or full time, small private University Hospital, to be associated with an Anesthetist. Write: Dr. Henry Thomason, Holmes Hospital, Cincinnati 29, Ohio.

NURSE ANESTHETIST to complete staff of five for 268 adult bed hospital, expanding to 500 soon, located near business district, Akron, Ohio. Surgery and OB. No call except relief. Forty hour week, extra for overtime. Four weeks vacation after year. Qualifications and experience govern salary offer. Apply: Administrator, St. Thomas Hospital, 444 N. Main St., Akron 10, Ohio.

WANTED: NURSE ANESTHETIST—A.A.N.A. member for modern accredited 100 bed hospital in Central Florida. Unusually pleasant working conditions. One hour drive from Gulf Beaches, liberal Personnel Policies. Write: Administrator, South Florida Baptist Hospital, Plant City, Fla.

NURSE ANESTHETIST, Male or Female, for hospital on Staten Island, N. Y., excellent conditions. Write: Box B-44, Journal American Association of Nurse Anesthetists, Prudential Plaza, Suite 3010, Chicago 1, Ill.

NURSE ANESTHETIST — well organized Anesthesia Department in General Hospital. Basic 40 hour week. Salary to $550.00 per month. Overtime pay. Vacation benefits to four weeks annually. Holiday pay. Sick benefits in cash. Pension retirement. Hospital located in beautiful lake land sport area, 40 minutes to downtown Detroit, within commuting distance of four Universities. Write: Personnel Department, St. Joseph Mercy Hospital, Pontiac, Mich.

WANTED: Two Nurse Anesthetists, 162 bed hospital, fully air-conditioned, relatively new building. Top salaries, open, depending upon qualifications. Please write stating qualifications and experience to E. B. Sledge, Administrator, Greenwood Leflore Hospital, Greenwood, Miss.

WANTED: Nurse Anesthetist—25 bed fully approved General Hospital, excellent working conditions, salary open —Contact: Administrator of A. C. H. Hospital, Shawnee, Okla.

URGENTLY NEEDED: Four Nurse Anesthetists, Surgical and Obstetrical, Male or Female, for university affiliated hospital with opportunity to advance education. Five days per week, one night call with compensation. Vacation and liberal benefits. Contact: Personnel Director, St. Mary's Hospital, 6420 Clayton Rd., St. Louis 17, Mo.

WANTED—Two Nurse Anesthetists to increase present staff. New air-conditioned 150 bed General Hospital to open September 1. Must be A.A.N.A. member. Salary open. Contact: Miriam P. Savage, St. Mary's Hospital, Green Bay, Wisc.

NURSE ANESTHETIST—61 bed hospital with new addition in progress. Located in the Shenandoah Valley and Blue Ridge Mountains near Richmond, Virginia and Washington, D. C. Inexperienced salary $450 per month with raise in 16 mos. and yearly thereafter. Experienced $475 per month and raise. Shoes and uniforms furnished. Excellent staff. Contact: Administrator — Waynesboro Community Hospital, Waynesboro, Va.

NURSE ANESTHETIST: For active 200 bed GM&S Hospital. Two anesthetist staff. Excellent working conditions. Salary dependent on qualifications. Liberal leave, retirement, and life insurance benefits. For further information write: Manager, V. A. Hospital, Altoona, Pa.

NURSE ANESTHETIST — 225 bed General Hospital, in process of building new 340 bed General Hospital overlooking lake. Good starting salary, excellent working conditions. No night call. Call or write Fred J. Schlosser, Jr., Personnel Director St. Mary's Hospital, Decatur, Ill.

NURSE ANESTHETIST (Female) for 130 bed hospital 30 mins. from ocean beaches, 2 hours from 3 metropolitan areas. Call one night a week and every third weekend with usually light load of emergency work. Anesthesiologist in charge. Starting salary $450 per month with room and board furnished. Contact: W. P. Portz, M.D., Milford Memorial Hospital, Milford, Del.

WANTED: One copy—Volume 13 of *Anesthesia Abstracts*. Reply: Box B-48, Journal American Association of Nurse Anesthetists, Prudential Plaza, Suite 3010, Chicago 1, Ill.

NURSE ANESTHETIST—The Chicago Lying-in Hospital of the University of Chicago, day duty, 8:00 a.m.-4:00 p.m. No call — excellent fringe benefits — salary open. For further information contact Dr. P. Ouda Olson, 5841 Maryland Ave., Chicago 37, Ill.

NURSE ANESTHETIST — 70 bed general accredited hospital in Montana College Town. Average 20 hour work week. No OB. Call time shared with another Anesthetist. Starting salary $500 per month plus complete maintenance. Liberal Personnel Policies and vacation. Apply Don Showman, Administrator, P. O. Box 1391, Havre, Montana.

The THIRTY-SECOND QUALIFYING EXAMINATION for membership in the American Association of Nurse Anesthetists will be conducted on November 12, 1960. The deadline for accepting completed applications including the transcripts is October 1. Notice of eligibility will be mailed about October 10.

Applications should be forwarded early enough to allow time to request transcripts and have them returned to the Executive Office before the deadline date.

A.A.N.A. Notes

The following booklets are available from the Executive Office at twenty-five cents each:

Notes on Ethics and Professional Adjustments

Notes on Legal Aspects of Anesthesia by Nurses

Notes on Psychology

Notes on a Review of Anatomy and Physiology

Notes on the Nervous System

Notes on the Respiratory System

Notes on the Circulatory System

Notes on the Excretory and Endocrine Systems

Notes on Anatomical Defects and Physiological Abnormalities. Part 1.

Notes on Chemistry and Physics.

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The Journal OF THE American Association of Nurse Anesthetists

Contributions to the Journal should be typewritten, double spaced, on one side of white typewriter paper. The title of the article and the author's name and title should appear at the top of the first page. Hospital or university affiliation, and the place and time when the paper was presented to a group should be included in a footnote on the first page.

Articles for publication in the Journal of the American Association of Nurse Anesthetists are accepted with the understanding that they have not been published or accepted for publication in other journals.

Illustrations should be glossy prints. Each illustration should carry a number and the author's name. Legends for illustrations should be typed on a separate page at the end of the manuscript. Tables should be prepared each on a separate sheet with the number and legend on the same sheet. Tables should not exceed one page under ordinary circumstances. The type size of the Journal page is 4 1/2 x 6 7/8 inches. Illustrations should be adaptable to this size or one column width, 2 1/8 inches.

References should be complete giving the full name of the author or authors, full title of the article, full title of the journal or book, volume number, page, month, date (when it applies) and year. The standard form of reference is included for the convenience of contributors.

Berger, Olive L.: The Use of Respirators in the Immediate Postoperative Period. J. Am. A. Nurse Anesthetists. 27:182, Aug. 1959.

Adriani, John: The Chemistry of Anesthesia. Springfield, Ill. Charles C Thomas, 1952.

Proofs will be sent to the author prior to publication.

Manuscripts should be submitted to the Editor of the Journal of the American Association of Nurse Anesthetists, Suite 3010, 130 E. Randolph St., Chicago 1, Illinois.